British airways
OVERSEAS DIVISION

Concorde

Flying Manual

Volume II (b)

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Copy No.....................

STATEMENT OF INITIAL CERTIFICATION.

This Manual is approved by British Airways Overseas Division in accordance with T.S.S Standard No.02.

This Publication forms part of the British Airways Overseas Division Approved Operations Manual.

Prepared by Technical Information Services.

British airways
OVERSEAS DIVISION

REVISION RECORD

Rev No	Date Entered	Initials	Rev No	Date Entered	Initials	Rev No	Date Entered	Initials

LETTER OF TRANSMITTAL NO. 26

AND

LIST OF EFFECTIVE PAGES

The contents of this permanent revision are approved by BA-OD in accordance with TSS Standard No. 0-2.

This manual consists of the following pages, listed to show the latest issue date of each enabling a complete check of all pages to be made.

1. INSERT and/or REMOVE pages as stated below.
2. REMOVE & DESTROY superseded pages.
3. Record this revision number on the Record Sheet.

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British airways

CONCORDE FLYING MANUAL
Volume II(b)
LETTER OF TRANSMITTAL

Temporary Revision Index
Page 1
4 OCT.79

TEMPORARY REVISION NO. 21

The contents of this temporary revision index are approved by BA-OD in accordance with TSS Standard No. 0-2.

PROCEDURE:

1. Insert attached pages.
2. File this page immediately following Frontispiece/Revision Record.
3. Record this revision on the Temporary Revision Record Sheet.

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British airways

TEMPORARY REVISION RECORD SHEET

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TEMPORARY REVISION RECORD SHEET

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(Deletion)

NORMAL PROCEDURES

GENERAL

All items of a given procedure are intended to prepare the aircraft for the next phase of flight. They are listed in sequence to a standardised scan. This enables the crew to use the actual equipment, instruments, selectors and switches as a physical checklist.

In the Captain's, First Officer's and Flight Engineer's cockpit preparation sections the balloon reference numbers next to section titles show the scan numbers as they are given on the illustrations 06.01.02 to 04.

Where an action is considered to be a safety item or is performed out of scan it is repeated in the NORMAL CHECKLISTS.

The "safety checklist" and "preliminary cockpit checklist" are unilateral i.e. the relevant crew member uses the check list as a reference to verify that the prescribed actions have been carried out.

The remaining checklists are of the conventional challenge/ response type. The First Officer challenges on the "before start checklist", pushback checklist and "after start checklist" and the Flight Engineer challenges on the "taxy checklist" and all other checklists.

The responding crew member shall respond to the challenge only after having checked the existing configuration.

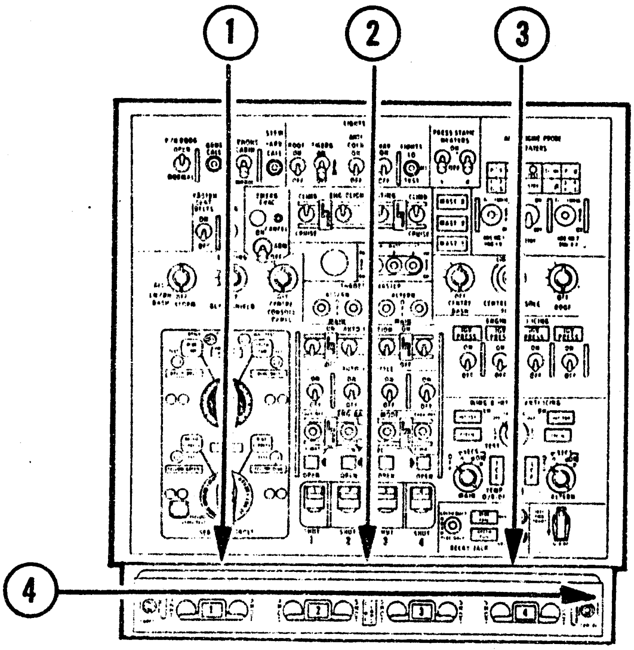
If the configuration is not in accordance with the written checklist response the responding crew member shall take corrective action before answering. If corrective action is not possible the response must be modified to reflect the actual situation.

The other crew members shall crosscheck whenever feasible the validity of the response. The challenger shall wait for the response before proceeding with the checklist.

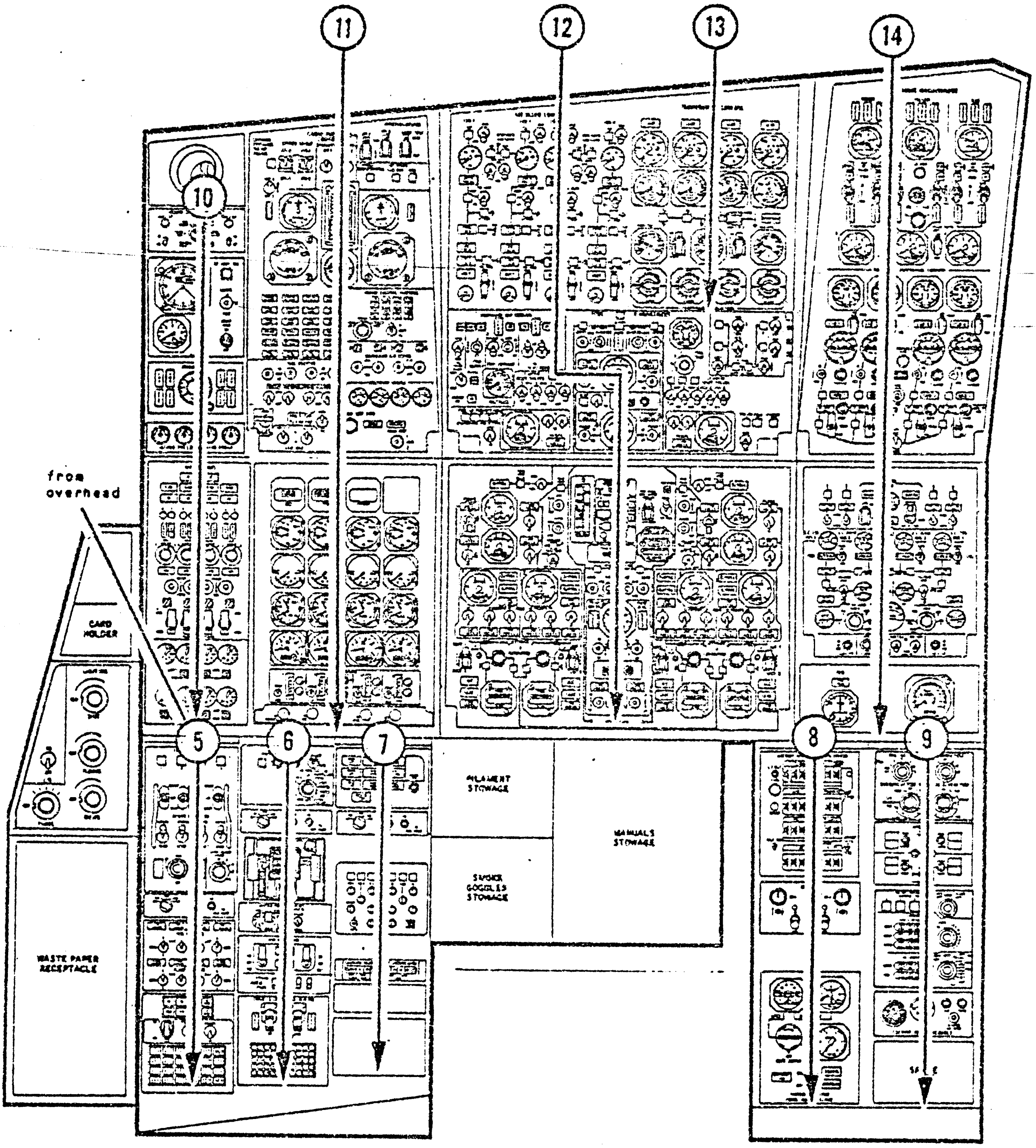
Boxed items need only be completed "EX BASE ONLY."

The statement "EX BASE ONLY" means out of London or where the aircraft transit has been greater than 4 hours.
The statement "INTO BASE ONLY" means into London or into a station where the planned transit is greater than 4 hours.

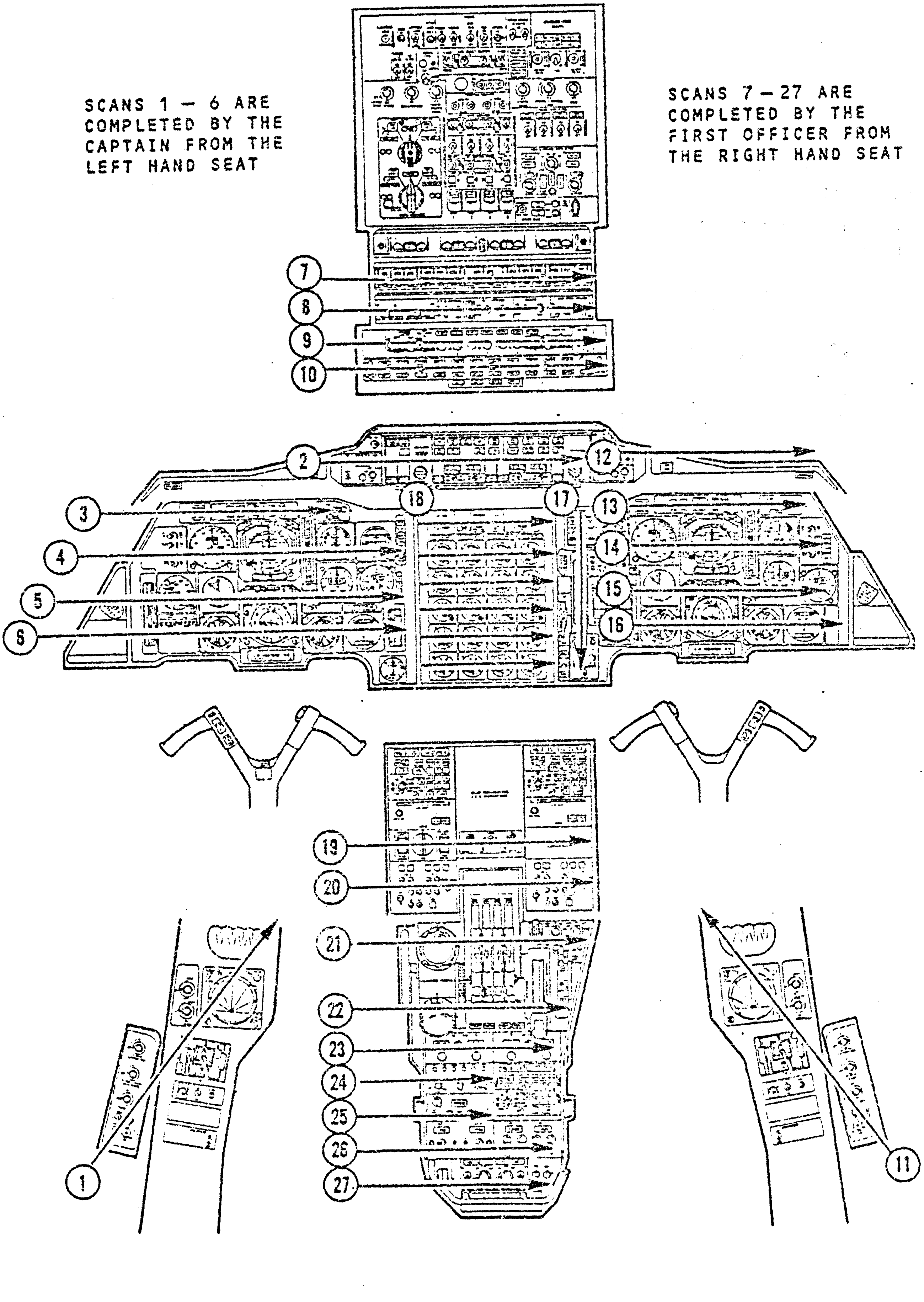
FLIGHT ENGINEER'S OVERHEAD SCAN SEQUENCE



FLIGHT ENGINEER'S PANEL SCAN SEQUENCE



PILOTS' PANEL SCAN SEQUENCE


SCANS 1 – 6 ARE COMPLETED BY THE CAPTAIN FROM THE LEFT HAND SEAT
SCANS 7 – 27 ARE COMPLETED BY THE FIRST OFFICER FROM THE RIGHT HAND SEAT
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11

EXTERNAL CHECK

This inspection is to be performed prior to each flight. Its completion ensures that the aircraft and/or surroundings are not obviously unsafe for operations.

Observe left static vent plates (2) are not damaged and vents (3) are clear.

Observe yaw vanes (2) covers removed and vanes not damaged.

NOTE
The yaw vanes are normally aligned with the longitudinal axis of the aircraft but may at this time be offset by crosswinds.

Observe crew oxygen vent disc intact.

Observe nosewheel free fall dump valve vent clear, and no hydraulic fluid leakage from vent.

Observe nose gear doors (2) are shut.

Observe land/taxi lights (2) are retracted and light not damaged.

Observe left anti-collision light fairing secure and light transparency clear and not damaged.

Observe left main landing light is retracted and light not damaged.

Observe nose wheel chocks in position.

Observe nose gear for condition.

NOTE
The general observation of nose gear should include:
- the doors attached to the gear are secure.
- the retraction jacks (2) are not damaged or leaking oil
- the steering unit is not damaged or leaking oil
- the torque links are connected and not damaged
- the oleo extension appears normal
- the tyres are not damaged and pressure normal
- hydraulic lines are not damaged or leaking oil

Observe nose gear door key in flight position and cap fitted.

Verify nose gear ground lock pin removed and locking plunger visible in hole.

Verify steering pin is correctly positioned for the ensueing departure.

EXTERNAL CHECK

NOTE
The nosewheel steering must be inhibited for a pull or push back departure.

Observe air conditioning discharge valve outlets clear and thrust recuperator open.

NOTE
The thrust recuperator is fitted to No.1 system discharge valve. It is open when the cabin differential pressure is less than 3 psi.

Observe left forward fuel vent clear.

Observe left wing de-icing mats for damage.

Observe underside of left wing.

NOTE
The general observation of the underside of the wing should include
- all panels secure
- no damage to wing surface
- no fuel leaks

Observe left navigation light glass clean and not damaged.

Observe movement area for elevons clear.

Observe left, mid and outer elevons for condition.

NOTE
The general observation of the elevons should include
- any signs of damage
- the jack fairings are secure with no hydraulic leaks
- static wicks (8) are serviceable

Observe No.1 engine hot and cold vents clear.

Observe No.1 nacelle aft bay door secure and lock pins (5) flush.

Observe No.1 nacelle access panels secure.

Observe left dry bay drain clear and no fluid leakage.

Observe No.1 engine fuel heater outlet clear

NOTE
Care should be excercised if the fuel heater is in use as the discharging air is extremely hot.

Observe No.1 engine oil tank vent clear.

EXTERNAL CHECK

Check No.1 engine bay ventilating door for free movement and open.

NOTE

The engine bay ventilating door is spring loaded to open.

Observe No.1 nacelle air conditioning heat exchanger flap inlet clear.

Observe No. 1 nacelle front bay door secure and pins (5) flush.

Observe ground under left hand intake spill doors is clear of stands and servicing equipment,
the spill doors are shut,
the auxiliary vanes for position,
the perforated bleed under No.2 intake is clear.

Observe No.1 air intake blanks removed,
air intake de-icing mats for damage,
air intake ramps are up.

Observe No.2 air intake blanks removed,
air intake de-icing mats for damage
air intake ramps are up.

NOTE

The air intake ramps front and rear are up when their inboard corners are aligned with markings on centre wall.

Observe left gear for condition.

NOTE

The general observation of the gear should include
- doors attached to leg secure
- main gear door shut
- retraction system not damaged
- the hydraulic lines are not damaged or leaking oil
- pitch dampers not damaged
- the torque links are connected and not damaged
- shortening lock jack not damaged or leaking oil
- the oleo extension appears normal
- the tyres are not damaged and pressure normal

Observe left gear ground lock pin removed.

Observe shortening lock jack pin removed.

Observe left main gear door key in flight position and cap fitted.

EXTERNAL CHECK

Observe left gear free fall dump valve vent clear and no hydraulic leakage from vent.

Observe No. 2 nacelle front bay door secure and pins (5) flush.

Observe No. 2 nacelle air conditioning heat exchanger flap inlet clear.

Observe No.2 nacelle access panels secure.

Check No.2 engine bay ventilating door for free movement and open

Observe No. 2 engine oil tank vent clear.

Observe No.2 engine fuel heater outlet clear.

Observe No.2 nacelle aft bay door secure and lock pins (5) flush.

Observe No.2 engine hot and cold vents clear.

Observe No.2 engine secondary nozzle buckets condition. No.2 engine primary nozzle blanks are removed.

Observe No.1 engine secondary nozzle buckets condition No. 1 engine primary nozzle blanks are removed.

Observe left inner elevon for condition.

NOTE

The general observation of the elevon should include
- any signs of damage
- the jack fairing is secure with no hydraulic leaks
- the ram air turbine door is secure

Observe hydraulic bay ventilating fan intake clear.

Observe air conditioning discharge valve outlets clear.

Observe fuel overflow/relief/overpressure valve outlet clear and no fuel leakage.

Observe hydraulic-driven fuel transfer pump drains clear and no fluid leakage.

Observe left side of fin and rudder for condition

EXTERNAL CHECK

NOTE

The general observation of the fin and rudder should include
- lower jack fairing secure and no hydraulic leaks
- fuel tank pressure inlets clear
- static wicks (8) are serviceable
- antenna secure

Observe tail gear for condition.

NOTE

The general observation of the tail gear should include
- doors secure
- no hydraulic leaks
- tail gear maintenance lock removed

Observe fuel tank pressurization static vent clear.

Observe fuel tank vents clear.

Observe fuel jettison outlet clear.

Observe rear navigation and anti-collision light glass clean and not damaged.

Observe movement for rudder clear.

Observe right side of fin and rudder for condition.

NOTE

The general observation of fin and rudder should include
- upper jack fairing secure and no hydraulic leaks

Observe right inner elevon for condition

NOTE

The general observation of the elevon should include
- any signs of damage
- the jack fairing is secure with no leaks

Observe No.3 engine secondary nozzle buckets condition, No.3 engine primary nozzle blanks are removed.

Observe No.4 engine secondary nozzle buckets condition; No. 4 engine primary nozzle blanks are removed.

Observe right dry bay drain clear and no fluid leakage.

Observe No. 3 nacelle aft bay door secure and lock pins (5) flush.

Observe No. 3 nacelle air conditioning heat exchanger flap

EXTERNAL CHECK

inlet clear

Observe No.3 access panels secure.

Observe No.3 engine hot and cold vents clear.

Check No.3 engine bay ventilating door for free movement and open.

Observe No.3 engine fuel heater outlet clear.

Observe No.3 engine oil tank vent clear.

Observe No.3 nacelle front bay door secure and pins (5) flush.

Observe ground under left hand intake spill doors is clear of stands and servicing equipment.
the spill doors are shut,
the auxiliary vanes for position,
the perforated bleed under No.3 intake is clear.

Observe No.3 air intake blanks removed,
air intake de-icing mats for damage,
air intake ramps are up.

Observe No.4 air intake blanks removed,
air intake de-icing mats for damage,
air intake ramps are up.

Observe right main gear for condition.

NOTE

The general observation of the gear should include.
- doors attached to leg secure
- main gear door shut
- retraction system not damaged
- the hydraulic lines are not damaged or leaking oil
- pitch dampers not damaged
- the torque links are connected and not damaged
- shortening lock jack not damaged or leaking oil
- the oleo entension appears normal
- the tyres are not damaged and pressure normal

Observe right gear ground lock pin removed

Observe shortening lock jack pin removed.

Observe right gear free fall dump valve vent clear and no hydraulic leakage from vent

Observe No.4 nacelle air conditioning heat exchanger flap inlet clear

Observe No.4 nacelle front bay door secure and pins (5) flush

Observe No.4 nacelle access panels secure

Observe No.4 engine hot and cold vents clear

Check No.4 engine bay ventilating door for freedom of movement and open.

Observe No.4 engine fuel heater outlet clear.

Observe No.4 engine oil tank vent clear.

Observe No.4 nacelle aft bay door secure and lock pins (5) flush.

Observe movement area for elevons is clear.

Observe right, mid and outer elevons for condition.

NOTE

The general observation of the elevons should include
- any signs of damage
- the jack fairings are secure with no hydraulic leaks
- static wicks (8) are serviceable

Observe right navigation light glass clean and not damaged.

Observe underside of right wing

NOTE

The general observation of the underside of the wing should include
- all panels secure
- no damage to wing surface
- no fuel leaks.

Observe right wing de-icing mats for damage.

Observe right forward fuel vent clear.

Observe right anti-collision light fairing secure and light transparency clear and not damaged.

Observe right main landing light is retracted and light not damaged.

Observe right and left ice detectors (2) not damaged and covers removed.

Observe temperature probes (2) are not damaged.

Observe forward servicing hatches secure.

EXTERNAL CHECK

Observe taxi-turn light not damaged.

Observe nose/visor hatches secure.

Observe right static vent plates (2) are not damaged and vents (3) are clear.

Observe incidence probes (2) not damaged and covers removed.

Observe pitot probes (2) not damaged and covers removed.

Observe radome secure and not damaged.

Observe nose pitot probe not damaged and cover removed.

Observe droop nose area is clear.

Observe ground supplies are properly parked and connected.

COCKPIT SAFETY CHECK

This check must be performed "EX BASE" upon entering the cockpit.
Its completion ensures that there will be no danger to the aircraft and/or personnel when powering the systems.

GROUND SERVICE sw ....ON

Set GROUND SERVICE sw to ON.
Observe vestibule fluorescent lights are on.

BOARDING, RACKING AREA and ROOF lts ....ON

Set BOARDING lts and RACKING AREA roof lt sws to ON.
Observe forward vestibule boarding lts and racking area roof lts are on.
Set ROOF lts sw to ON or OFF as required.
Observe lts are as selected.

L/gear STANDBY LOWERING lever ....GUARDED

Observe L/Gear STANDBY LOWERING lever at NEUTRAL and guarded.

Transponder ....STBY

Verify ATC mode sel at STBY

Radar ....OFF

Verify radar OFF pb is engaged.

NOTE
The radar OFF push button light (white) comes on as soon as the aircraft busbars are supplied.

EMERGENCY NOSE/VISOR UPLOCK RELEASE ....DOWN/PIN ENGAGED

Verify EMERGENCY NOSE/VISOR UPLOCK RELEASE is down, with pin engaged.

NOSE AND VISOR STBY control ....OFF/GUARDED

Verify NOSE and VISOR STBY control is OFF and guarded.

L/GEAR normal lever ....DOWN

Verify L/GEAR lever at DOWN.

GEAR O/RIDE ....GUARDED

Verify GEAR O/RIDE guarded.

VISOR/NOSE lever ....AS CONFIGURATION

Verify that VISOR/NOSE lever position coincides with visor/nose configuration.

This check prevents any uncontrolled movement of the droop nose and visor when the green hydraulic system is pressurized.

AUTO IGNITION sws .... OFF

Verify AUTO IGNITION sws (4) at OFF

NOTE

This prevents,

1. Operation of the start pump and engine igniters should the throttle master sel be at MAIN or ALTERN and the HP VALVE sw be at OPEN.
2. Operation of the start pump and opening of the start valve when the debow switch is at debow and LH or BOTH igniters selected.

ADS/ENGINE PROBE HEATERS ....OFF

Verify ADS 1, and ADS 2, sels at OFF and STBY sw at OFF.

WING & INTAKE ANTI-ICING test ....OFF

Verify WING & INTAKE ANTI-ICING TEST rty sel at OFF

FUEL FWD TRANS sw ....GUARDED

Verify FUEL FWD TRANS sw is guarded.

TRIM TRANS AUTO MASTER sel ....OFF/GUARDED

Verify TRIM TRANS AUTO MASTER sel set at OFF and guarded.

TANK 11 INLET VALVES sels ....AUTO/OFF

Verify tank 11 INLET VALVES, MAIN sels at AUTO AND OVERRIDE sels at OFF.

STANDBY INLET VALVES sws ....SHUT

Verify STANDBY INLET VALVES sws are at SHUT.

This prevents any inadvertent transfer of fuel when electrical power is supplied.

(Deletion)

TRIM PIPE DRAIN sw ....SHUT

Verify TRIM PIPE DRAIN sw at SHUT.

Jettison panel cover ....CLOSED

Verify the jettison panel transparent covers are closed.

06-03-03

COCKPIT SAFETY CHECK

NOTE: This prevents any accidental discharge of fuel when electrical power is supplied.

RAM AIR TURBINE SELS ....GUARDED

Verify the RAM AIR TURBINE sels (2) are at OFF and guarded.

W/SHIELD EMERG DE-ICE sws ....OFF/GUARDED

Verify the W/SHIELD EMERG DE-ICE sws (2) are at OFF, guarded and fuse wire locked.

Circuit breakers ....SET

Verify all flight deck C/B's are set, unless collared.

NOTE: It is assumed, that after the initial circuit breakers check only one reset may be performed on any C/B.

NORMAL PROCEDURES
COCKPIT PRELIMINARY PREPARATION

TECHNICAL LOG .... CHECK

Examine the technical log. Observe that any items not required for dispatch are placarded appropriately.

GROUND POWER .... ON

Observe GRND PWR AVAILABLE lt (white) on.
Set ground power sw to CLOSE and release.
Observe general lighting up of panels.

NOTE

The SSB connects the left hand main a.c. system to the right hand main a.c. system. If the SSB is OPEN the ground supply is isolated from all except ground supply busbars.

Push MWS CANCEL pb and observe MWS lts go off.
Observe AC MAIN BUS lts are off.

Observe AC ESS BUS lts are off.

Observe DC MAIN BUS lt off and DC ESS BUS lts off.

Verify battery sels at BATT OFF
Observe battery MIs crossline and BATT ISOLATE lts (amber) on.
Observe DC ESS/MAIN split MIs inline.

EQUIPMENT BAY COOLING PANEL ....CHECK/SET

Observe FLOW lts are off.
Verify Fan 2 sel and Fans 1 and 3 sel at AUTO.
Observe Forward Extract M1 reads ON.

Verify Forward Supply Fans sel at NORM.
Observe LH and RH Supply Fan MIs read ON.

Verify Rear Extract LH and RH Fans sws at ON and Standby Fan sw at OFF.
Observe LH and RH Rear Extract Fan MIs read ON.

Verify Forward Emergency Relief Valve sw at SHUT and MI reads SHUT.
Observe Forward Flow Indicator reads 0.85 to 1.1 kgs/sec.
Observe Hydrualic Bay Fan MI reads ON.

(Completely Revised)

On the FORWARD EXTRACT panel

Set Fan 2 sel to OFF
Observe - Forward Extract MI reads OFF
- Flow lts remain OFF
- Flow Indicator reads 0.7 to 0.85 kgs/sec

Set Fans 1 and 3 sel to OFF
Observe - Flow lts on
- MWS AIR (amber) ON
- Flow Indicator reads zero

Set Fan 2 sel to AUTO
Observe - Flow Indicator reads 0.4 to 0.55
The Flow lts and MWS AIR may be on or off

Set fans 1 and 3 sel to AUTO
Observe - Forward Extract MI reads ON
- Flow lts OFF
- MWS AIR OFF

On the REAR EXTRACT panel
Set LH and RH fans to OFF
Observe - LH and RH MIs read OFF
- Flow lt ON
- MWS AIR (amber) ON

Set STANDBY fan to ON
Observe - Flow lt OFF
Set LH and RH fans to ON
Observe LH and RH MIs read ON
Set STANDBY fan to OFF

On the FORWARD EXTRACT panel
Set the FORWARD EMERGENCY RELIEF valve to OPEN
and observe MI reads OPEN
Set the FORWARD EMERGENCY RELIEF valve to SHUT
and observe MI reads SHUT

OXYGEN PANEL ....CHECK/SET

Observe THERAPEUT OPEN, EMERG and NORMAL lts off.
Observe PASSENGER SYSTEM EMERG MANUAL O/RIDE sw at OFF and guarded.
Observe the dual pressure indicator pointers show sufficient for flight plan and no failure flag visible.

NOTE
For minimum pressure required for the number of passengers and flight time
See MEL 05-03-19

Observe PASSENGER supply pressure indicator pointer shows approx. 40 psi and no failure flag visible.
Press and turn CREW SUPPLY rty sel to inline.
Observe CREW delivery pressure gauge pointer in green arc.

(Completely Revised)

DRAIN MAST HEATERS .... CHECK/SET

Verify DRAIN MAST HTRS sels off.
Observe MAST 1 MAST 2 and MAST 3 lts. off.

Press and release MAST 1, MAST 2 and MAST 3 lts in turn.
Observe lts on while pressed.
Set DRAIN MAST HTRS sel 1 to the top ON position.
Observe MAST 1 lt off.
Press and release MAST 1 lt.
Observe lt remains off.
Repeat the lt off check for DRAIN MAST HTRS sel 1 at bottom ON position.
Repeat the actions for drain MAST HTRS sel 2.
Repeat the actions for DRAIN MAST HTRS sel 3.

Observe total air temperature

IF ... total air temperature above 0 deg C.
Set DRAIN MAST HTRS sels to OFF.

IF ... total air temperature below 0 deg C
Set DRAIN MAST HTRS sels to ON.

INS 1, 2 & 3 .... SELECT ALIGN, TEST & PRESENT POSITION

Set the mode rty sel on MSU 1, 2 and 3 to ALIGN.

NOTES

This portion of the pre-flight check may be done by one of the pilots to expedite the alignment process.

The airplane must not be towed or taxied during INS alignment.

Adjust DIM switch on INS data selector switch to desired intensity; check that INSERT switch is illuminated and FROM-TO indicates 01 on each module.

Test INS circuits status:

Press TEST switch; check that all INS lamps (except keyboard and clear lamps) illuminate, figure eight (8) appears in all digit positions of both data displays, directional letters (NS) appear in the left display, directional letters (EW) appear in the right display, and FROM-TO indicates 88. Also check that INS READY NAV and BAT lights on their respective INS mode selector modules illuminate.

Repeat test on each module.

(Completely Revised)

Check INS malfunctions:

Warn light on each control display module and BAT light on each mode selector module should be extinguished. Illumination of the BAT light (amber) on the control display modules during align mode indicated that battery power is operating normally.

Load INS Field Position Data:

Position data selector switch to POS.
Press keyboard switch for north (N2) or south (8S) latitude as required.
Press keyboard switches in sequence for present position latitude and observe correct latitude in left data display.
Press INSERT switch and observe loaded LAT ± 0.1' in left data display.
Press keyboard switch for east (6E) or west (W4) longitude as required.
Press keyboard switches in sequence for present position longitude and observe correct longitude in right data display. Press INSERT switch and observe insert light extinguish and new present position data, latitude and longitude, ± 0.1' appear in left and right data displays.
Repeat for each INS module.

Record INS 3 displayed present position on flight engineer's flight log. Cross check recorded position with listed ramp position in the Aerodrome Folder.

AIR DATA COMPUTERS .... ON

Set ADC 1 sw to ON and verify ADC 1 rty sel at NORM.
Set ADC 2 sw to ON and verify ADC 2 rty sel at NORM.

IF ...the ADC 1 and/or ADC 2 lts (amber) on, when the flight instruments stabilise press to reset.
Observe the ADC 1 and ADC 2 lts off.

COCKPIT EMERGENCY EQUIPMENT ....CHECK

Verify fire axe stowed and secure, and asbestos gloves, portable oxygen mask, portable oxygen pack, life jackets (5) and eyewash kit stowed.
Verify fire extinguisher stowed and secure.
Verify smoke goggles (3), safety torch and escape ropes (2) stowed.

FLIGHT ENGINEERS DOCUMENTATION STOWAGES ....CHECKED

Check the contents as the Flight Equipment Check List (Navigation Manual Sect 8.).

(Completely Revised)

FLIGHT ENGINEER'S COCKPIT PREPARATION ①

Miscellaneous switches ....AS REQUIRED

Set F/D DOOR sw to OPEN.
Observe GRND CALL pb lt is off.
Set I/PHONE sw to NORMAL.
Observe STEWARD CALL lt is off.

Cabin signs Fasten seat belts/No smoking ....ON

Set FASTEN SEAT BELTS sw to ON. Verify NO SMKG sw to ON.

Emergency evacuation warning ....CHECK/ARM

> Announce on PA that an evacuation test signal is being actuated and request the cabin crew to report the signal operation.
> Set EMERG EVAC sel to ON.
> Observe EMERG.EVAC. lt (red) flashing and audio (bleeper)
> Press the EMERG EVAC CANCEL pb.
> Observe the audio off.

Set the EMERG EVAC sel to ARM.

Lighting ....AS REQUIRED

Rotate the LIGHTING STORM, LIGHTING GLARESHIELD and LIGHTING CENTRE CONSOLE PANEL rty sel to the required position. Observe lighting as selected.

Servo Control Panel .... CHECK/SET

Observe - Black and Yellow rty sels are at NORMAL
- Blue Jam and Green Jam lights off.

Press the Blue Jam Test pb light.
Observe Blue Jam light (red) and MWS PFC (red) on.
Repeat, using Green Jam Test pb light.

Observe Green Low Pressure light (red) and Blue Low Pressure light (red) on.
Pull and rotate the Yellow rty sel towards the Blue Low Pressure light.
Observe - Yellow Blue pea lights (green) on.
- Green Only pea lights (green) on
- Green Low Pressure and Blue Low Pressure lights remain on.

Lift the guard and press the Yellow Level Test pb
Observe - Yellow Blue pea lights off
- Yellow Green pea lights (green) on

Pressing the Yellow Level Test pb with the Yellow rty sel away from Normal checks the first low level cut off of yellow supply to the selected system and the autochange to the non-selected system when low pressure exists in that system.

Release the Yellow Level Test pb
Observe - Yellow Blue pea lights (green) on
- Yellow Green pea lights off.

Pull and rotate the Yellow rty sel to Normal.
Observe - Yellow Blue pea lights off
- Green Only pea lights off.

Pull and rotate the Yellow rty sel towards the Green Low Pressure light
Observe - Yellow Green pea lights (green) on
- Blue Only pea lights (green) on.

Lift the guard and press the Yellow Level Test pb.
Observe - Yellow Green pea lights off
- Yellow Blue pea lights (green) on.

Release the Yellow Level Test pb.
Observe - Yellow Green pea lights (green) on
- Yellow Blue pea lights off.

Pull and rotate the Yellow rty sel to Normal.
Observe - Yellow Green pea lights off.
- Blue Only pea lights off.

(Completely Revised)

Lights .... AS REQUIRED

Set ROOF LIGHTS sw as required.
Set EMERG LIGHTS sel to ARM.
Observe flight deck Emergency Lights and EMERG LIGHTS sel light off.

IF ... flight deck Emergency Lights on, verify forward stewards panel EMERG LIGHTS sw at NORMAL.

Verify ANTI-COLLISION LIGHTS sw at OFF.
Set NAV LIGHTS as required.
Select and hold LIGHTS TEST sel to TEST.
Observe - on F/E's scan line ①, no lights illuminate.
- on F/E's scan line ②, Throttle Master sels lights on.
- on F/E's scan line ③, all lights on except Relay Jack lts.
- on F/E's scan line ④, only Fire Flaps light on.
- Transparency De-ice/Demist and Landing Lights Extended lts on.

Release LIGHTS TEST sel to HI or set to LO as required.
Observe lights return to system status.

Engine flight rating ....CLIMB

Verify ENG FLIGHT RATING sws at CLIMB.

Drain Mast heaters ....AS REQUIRED

Confirm DRAIN MAST HTRS sels as required.

Throttle masters..ON

Verify THROTTLE MASTER sels at MAIN or ALTERN
Observe sel lts off, THROT lts off.

NOTE

An intake mounted T1 (engine probe) supplies temperature information to the Main throttle control system of its own engine and to the Alternate throttle control system of the adjacent engine. Therefore it is recommended that the Main throttle control system is used for engine starting whenever all the engine temperatures are not the same.

Auto-ignition ....OFF

Verify AUTO IGNITION sws at OFF

Autothrottle ....ON

Verify AUTO THROTTLE sws at ON.

Engine rating mode ....TAKE OFF

Observe ENG RATING MODE sws at TAKE-OFF. T/O lt (white) on.

HP valves .... SHUT

Verify HP VALVE sws at SHUT and MIs read SHUT

Pressurisation static heaters .... OFF

Verify PRESS STATIC HEATERS sw 1 and sw 2 at OFF.

ADS/ENGINE PROBE HEATERS .... CHECK

Confirm ADS 1, and ADS 2, sels at OFF and STBY sw at OFF.

Observe all ADS/ENGINE PROBE HEATERS lts (yellow) on.

Lighting .... AS REQUIRED

Set LIGHTING CENTRE DASH, LIGHTING CENTRE CONSOLE FLOOD and LIGHTING ROOF rty sels as required and observe lighting as selected.

Engine anti-icing .... OFF

Verify ENGINE ANTI-ICING sws OFF and IGV PRESS lts off

Wing and intake anti-icing .... OFF

Verify WING & INTAKE ANTI-ICING rty sel MAIN OFF and ALTERN OFF.

Relay jack panel .... CHECK/TEST

Verify RELAY JACK sel at NORM.
Observe RELAY JACK BLUE lt and GREEN lt off.

> Press to test BLUE TEST pb and observe BLUE JAM lt (red), and MWS PFC (red) on.
> Repeat test using GREEN TEST pb.

FUEL FWD TRANS sw .... GUARDED

Confirm FUEL FWD TRANS sw guarded.

Engine shut-down/fire controls .... CHECK

Observe engine shut-down handles fully in.
Observe SHOT 1 and SHOT 2 frangible discs intact.
Observe engine shut-down handles filaments off.

Observe FIRE FLAPS lt off.

NO.1 AUTOSTABS .... CHECK

Verify that the No. 1 Autostabs will latch at the engage position. This confirms that the EMERGENCY CONTROLS pb is not in the engaged position.

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FLIGHT ENGINEER'S COCKPIT PREPARATION ⑤⑥

Engine Starting Panel .... SET

Verify START/RELIGHT sels at OFF.
Observe START VALVE MIs read SHUT.
Verify ENGINE DEBOW sws at NORMAL
Observe DEBOW sw lts off.
Verify ignition rty sel at BOTH or LH or RH.
Observe LH IGN and RH IGN lts off.
Verify EMERG RELIGHT BUSBARS rty sel at OFF.

INS 1 MSU ....ALIGN

Observe INS 1 MSU rty sel at ALIGN, BAT lt off and READY NAV lt off unless status 5 reached on INS 1.

Fire sensors/Flame sensors ....BOTH

Verify FIRE SENSORS sels at BOTH and FIRE SENSOR lts off

Verify FLAME SENSOR sels at BOTH. and FLAME SENSOR lts off.

Intake diagnosis ....CHECK

Verify the INTAKE TEST master sw guarded at OFF

Hold the INTAKE TEST RESET sw at RESET momentarily then release
Observe intake test lights, ON,GO, N1 REQD, G/Y REQD,HOLD, FAIL, and B/Y REQD off.
Observe the fault identification lts N11, N12, N13 and N14 (yellow) on.

NOTE
The fault identification lights are used to identify line replacement units (LRU) in the air intake control systems when they have failed. The lights indicate failure during test or normal operation of the intakes. When electrical power is removed from the air intake systems random indications of failure may be latched on. When electrical power is re-established, momentarily selecting RESET resets the system and removes false warnings from the panel.

CAUTION
The intake test master switch must not be moved from its guarded OFF position in flight.

Fuel vent ....TEST

Observe FUEL VENT ignition protection MI reads FULL.
Press and hold FUEL VENT TEST pb
Observe MI reads DIS.
Release FUEL VENT TEST pb
Observe MI reads FULL.

(Unchanged)

LIMIT RESET pb ....PRESS

Press the LIMIT RESET pb
Observe the N2, N1, and fuel tank pressure pointers are reset.

Air cond. test ....OFF

Verify AIR COND TEST sw and AIR COND TEST rty sel both at OFF.

INS 3 MSU ....ALIGN

Observe INS 3 MSU rty sel at ALIGN, BAT lt OFF and READY NAV lt off unless status 5 reached on INS 3.

Oxygen (mask) ....CHECK

On the associated audio selector panel set RT/INT sw to INT.
Press INT pb lt.
Observe INT pb lt (white) on.
Rotate BOOM/MASK rty sel to MASK and don headset.
On mask stowage panel;
Observe blinker indicator shows black.
Push down and hold RESET/TEST slide control at TEST.
Observe blinker indicator shows yellow cross, then shows black.
With RESET/TEST slide control still held at TEST, squeeze the red levers.
Observe blinker indicator shows yellow cross, then shows black.
With RESET/TEST slide control still held at TEST, verify N/100% sw at 100%.
Press, momentarily, TEST pb
Observe the sound of oxygen flowing over the mask microphone.
Release RESET/TEST slide control and verify white area not visible
Observe blinker indicator shows black.
On the associated audio selector panel, rotate BOOM/MASK rty sel to BOOM. Remove headset.

Artificial feel ....CHECK

Set the ARTIFICIAL FEEL No 1 PITCH, ROLL and YAW sws to engage.
Move the guard and press to test the ARTIFICIAL FEEL TEST 1 pb. Observe ARTIFICIAL FEEL No. 1 PITCH, ROLL and YAW sws drop to OFF, MWS FEEL lt (red) on.

Repeat the test for ARTIFICIAL FEEL No. 2.

INTERPHONE ....FLIGHT

Verify SERVICE I/PHONE sw at FLIGHT

RAT ....CHECK/TEST

Observe RAT lt off.
Verify RAM AIR TURBINE sels (2) at OFF, guarded and wire locked.

Set and hold left hand RAM AIR TURBINE sel to TEST and observe TEST lt (blue) on.

Release left hand RAM AIR TURBINE sel.
Observe TEST lt is off.

Repeat the last two actions, using the right hand RAM AIR TURBINE sel.

A.I.C.S. GROUND/FLIGHT sws (4) ....FLIGHT

Verify AICS GROUND/FLIGHT sws (4) at FLIGHT and guarded.

Cyclic and continuous icing ....CHECK

Observe CYCLIC lts (2) off, digital indicators LEFT and RIGHT read 00, indicators 1 through 20 left hand are off and indicators 1 through 20 right hand are off.

Door warning lights ....CHECK

Observe DOOR SW FAULT lt is off.

INS 2 MSU ....ALIGN

Observe INS 2 MSU rty sel at ALIGN, BAT lt off and READY NAV lt off unless status 5 is reached in INS 2.

Audio selector panel ....SET

Verify BOOM SET is connected on the flight engineer's JACK BOX.
On the flight engineer's audio panel, press INT pb lt.
Observe INT pb lt (white) on.
Verify BOOM/MASK sw set at BOOM; set RT/INT sel to OFF.

(Unchar

L/G Fault annunciator ....CHECK

Observe LANDING GEAR FAULT ANNUNCIATOR lts off.

NOTE
The landing gear fault annunciator lights are not energized when the L/GEAR lever is set to DOWN.

FLIGHT ENGINEER'S COCKPIT PREPARATION ⑧

Jack box ....CHECK

Observe condition.

AIDS ....CHECKED/SET

Observe FAULT light on
Confirm Fault Ident Selector at SYS
Hold the Test switch to ON, then release:-

Observe - FAULT light off and Flight Data Recorder MI black
- on release, FAULT light on and MI yellow.

IF......FAULT light remains illuminated on test,
- hold the Test switch at ON
- rotate the Fault Ident selector to each position in turn

When each unit is tested, the FAULT light will be on if a fault is detected or off if the unit is serviceable.

Press the CLEAR MEMORY key to clear any previously recorded exceedances.

Set the date code and date into the memory as follows:-

- clear the displays by pressing the CLEAR Key
- key in the date code 1001
- key in the day and month, e.g. 1606 for 16th June
- observe code and date in LH and RH displays respectively
- press the INSERT key

The data will be transferred from the memory to the tape when the recorder runs.

Compass ....SET

Verify No.1 and No.2 DG MAG mode sels set at MAG.
Observe monitor lts off, annunciators centred.

Oxygen panel ....CHECK

Confirm CREW SUPPLY rty sel at inline.

Contued ....

NOZ. AIR SOV & WIND DOWN TEST ....CHECK/OFF

Verify ENG 1 & 4 and ENG 2 & 3 NOZ AIR SOV & WIND DOWN TEST rty sels at OFF.

Observe REV lts (4) off and WIND DOWN lts (4) off
Advance the throttle levers (4) to their mid-travel position
Attempt to raise the reverse thrust levers (4).

NOTE
With the throttle levers away from the idle position it should not be possible to raise the reverse thrust levers because of a mechanical interlock.

Rotate ENG 1 & 4 and ENG 2 & 3 rty sels to A
Observe REV lts (4)(blue) on and WIND DOWN lts (4) off.

Rotate ENG 1 & 4 and ENG 2 & 3 rty sels to B
Observe REV lts (4)(blue) on and WIND DOWN lts (4)(yellow) on

Rotate ENG 1 & 4 and ENG 2 & 3 rty sels to C
Observe REV lts (4)(blue) flash and WIND DOWN lts (4) off

Retard the throttle levers (4) to idle
Rotate ENG 1 & 4 and ENG 2 & 3 rty sels to B
Observe REV lts (4)(blue) on and WIND DOWN lts (4) off

Lift the reverse thrust levers (4) to their mid travel position
Rotate ENG 1 & 4 and ENG 2 & 3 rty sels to OFF
Observe REV lts (4) off WIND DOWN lts (4) (yellow) on.

Push the reverse thrust levers (4) fully down.
Observe WIND DOWN lts (4) off.

Eng O/heat ....TEST

Rotate ENG O/HEAT TEST rty sel to F1.
Observe ENGINE O/HEAT lts (4)(red) and MWS ENG lts (4)(red) and (4)(amber) on and audio (gong).

NOTE
Whenever the ENG O/HEAT rty sel is moved to or from a "flame" position the FLAME SENSOR lights will flash momentarily.

Rotate ENG O/HEAT TEST rty sel to position between F1 and F2.
Observe, after 5 seconds, ENGINE O/HEAT lts (4) and MWS ENG lts (8) off.

Rotate ENG O/HEAT TEST rty sel to F2.
Observe ENGINE O/HEAT lts (4)(red) and MWS ENG lts (4) (red) and (4)(amber) on and audio (gong).

ENGLAND

(Unchanged)

Rotate ENG O/HEAT TEST rty sel to position between F2 and F3.
Observe, after 5 seconds, ENGINE O/HEAT lts (4) and MWS ENG lts (8) off.

Rotate ENG O/HEAT TEST rty sel to F3.
Observe ENGINE O/HEAT lt (4) (red) and MWS ENG red (4) and amber (4) on.

Rotate ENG O/HEAT rty sel to reset.
Observe ENGINE O/HEAT lts (4) and MWS ENG lts (8) off.

Rotate ENG O/HEAT rty sel to OFF.

Fire and nac. o/heat ....TEST

Rotate FIRE & NAC O/HEAT TEST rty sel to O/HEAT.
Observe NAC/WING lt (4) (amber) and MWS ENG amber (4) on.

NOTE
There is no means of testing the wing overheat detection systems.

Rotate FIRE & NAC O/HEAT TEST rty sel to FAULT A.
Observe FIRE SENSOR lts (4) (amber) and MWS ENG amber (4) on

Set FIRE SENSORS sels (4) to B.
Observe FIRE SENSOR lts (4) and MWS ENG lts (4) off.

Rotate FIRE & NAC O/HEAT TEST rty sel to FAULT B.
Observe FIRE SENSOR lts (4) (amber) and MWS ENG amber (4) on

Set FIRE SENSORS sels (4) to A.
Observe FIRE SENSOR lts (4) and MWS ENG lts (4) off.

Set FIRE SENSORS sels (4) to BOTH.
Observe FIRE SENSOR lts (4) (amber) and MWS ENG amber (4) on

(Deletion)

Rotate FIRE & NAC O/HEAT TEST rty sel to FIRE 1
Observe FIRE SENSOR lts off, No.1 engine shut down handle lts (2) (red) flashing, MWS ENG 1 (red) on, and distinctive fire audio (bell).

Rotate FIRE & NAC O/HEAT TEST rty sel to FIRE 2.

Observe FIRE SENSOR lts off, No.2 engine shut down handle lts (2) (red) flashing, MWS ENG 2 (red) on and distinctive fire audio (bell); No. 1 engine shut down lts (2) and MWS ENG 1 off.

Repeat the last test to test FIRE 3 and FIRE 4.

Rotate FIRE & NAC O/HEAT TEST rty sel to OFF.
Observe No.4 engine shut down handle lts (2) and MWS ENG 4 off.

AFCS ....CHECK

Verify IFM/OFF/TEST sels 1 and 2 set at OFF.

Set IFM/OFF/TEST sels 1 and 2 to IFM.
Observe that after 40 secs all indicators show blank.

Verify FLIGHT/TEST ALL/TEST UNIT sel at FLIGHT.

NOTE

ITEM will display any AFCS failures detected but will memorise them only if they occur after take-off. If a failure occurs before take-off and the crew wish it to be memorised the TEST IFM INDICATOR pb lts (2) must be pressed. ITEM will then memorise the displayed fault and any subsequent faults.

Fire ext. pressure cartridge ....CHECK

Verify FIRE EXT PRESSURE CARTRIDGE TEST rty sel at NORM.
Observe MIs (4) read FULL.
Rotate rty sel to FIRST SHOT.
Observe MIs (4) read DIS.
Rotate rty sel to NORM.
Observe MIs (4) read FULL.
Rotate rty sel to SECOND SHOT.
Observe MIs (4) read DIS.
Rotate rty sel to NORM.
Observe MIs (4) read FULL.

Smoke detection ....CHECK

Verify SMOKE CABIN AND FREIGHT HOLD rty sel at NORM
Observe SMOKE A,B,C,D,E,F,G,H,J and K lts off.
Verify AIR GENERATION rty sel at NORM
Observe SMOKE 1,2,3 and 4 lts off
FAULT 1,2,3 and 4 lts off
MWS SMOKE lt off.

(Deletion)

Cockpit voice recorder ....CHECK

Press the TEST pb
Observe indicator needle deflects into the green band.

FLIGHT ENGINEERS COCKPIT PREPARATION 10

Ground hydraulic check-out panel .... OFF/YELLOW YELLOW

Verify PUMP 1 G-Y and PUMP 2 B-Y sws at off.
Verify rty sel is set to YELLOW YELLOW.

Clock .... SET

To adjust the GMT display,
- set the Timer/Chro switch to CHRO
- set the GMT sel. to FAST or SLOW as required.

When the correct time is established,
- set the GMT sel. to RUN.

To set a countdown time in the Chrono display,
- set the Timer/Chro switch to TIMER
- set the GMT sel. to FAST or SLOW as required.

When the countdown time in mins & secs is established,
- set the GMT sel. to RUN.

Verify correct GMT set.
Verify Timer/Chro sw at CHRO.
The Flight Engineer's clock is used as a conventional stop clock for take-off in order to time Contingency, Take-off and reheated Climb ratings.

Flight data recorder .... CHECK

Observe FLT DATA REC MI shows yellow.

Fwd Lights .... TEST

Select and hold the Fwd Lights sel to TEST. Observe on the forward section of the Flight Engineers panel, all warning lights on. Release to HI or LO.

Brakes accumulator .... AS REQUIRED

Observe brakes accumulator pressure gauge reading 3000 PSI minimum and no flag visible.

Brakes overload .... CHECK

Observe BRAKES OVERLOAD MI shows black.

Brake fans .... AS REQUIRED

Verify BRAKE FANS sw as required.

Brakes temperature .... TEST

Press and hold BRAKES TEMP TEST pb.
Observe BRAKES TEMP gauge reads approx 270 deg C, 1,2,3, and 4 FWD and REAR lts (red) on and WHEELS O/HEAT lt (red) on.
Release BRAKES TEMP TEST pb.

Intake pressure ratio error ....CHECK

Observe INTAKE PRESSURE RATIO ERROR instruments pointers vertical between amber bands.

Intake panel ....SET

Verify the RAMP/SPILL MASTER sws at MAN
Observe INTAKE lts (red) on and all other AIR INTAKES panel lts off.
Verify LANE rty sels at AUTO A or AUTO B position as required for the flight.
Verify HYD sels at AUTO.
Observe AUX INLET MIs agree with the position of the auxiliary inlet vane observed during the external check.
Observe RAMP indicators pointers at 0%, RAMP inching sws at centre position, SPILL indicators pointers at 0% and SPILL inching sws at centre position.

Cabin pressure control ....CHECK/TEST

Verify GROUND PRESSURE RELIEF VALVE sel at AUTO
Observe GROUND PRESSURE VALVE MI reads OPEN.
Verify SYSTEM SELECT sws as required, DISCHARGE VALVES SYS 1 and SYS 2 sels at NORM, DITCHING VALVES SYS 1 AND SYS 2 sws at NORM and guarded and EMERGY DEPRESS sel at NORM and guarded.

Observe THRUST RECUPERATOR MI reads OFF, and AIR VENTS HYD MI reads OPEN.

Press to test EXCESS ALT lt.
Observe EXCESS ALT lt (red) on, MWS PRESS (red) on and intermittent horn.

Observe cabin altitude indicator pointer indicates correct airfield pressure altitude.
Observe cabin differential indicator pointer indicates 0.
Press to test O/PRESS lt.
Observe O/PRESS lt (red) on, MWS PRESS (red) on.

(Deletion)

On system 1 cabin alt sel, rotate knob B to set cursor at 1013 mb and rotate knob A to set cabin altitude to that required. Verify altitude shown in lower window is higher than the highest flight level planned for the cruise.
Rotate knob R to set cabin rate of climb; white dot is approx 400 ft/min.
Repeat action, using system 2 cabin alt sel.

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Observe SYS 1 and SYS 2 discharge valves position indicators FWD and AFT at open.
Set DISCHARGE VALVES SYS 1 and SYS 2 sels to FWD SHUT.
Observe SYS 1 and SYS 2 FWD discharge valves position indicators move towards SHUT.
Set DISCHARGE VALVES SYS 1 and SYS 2 sels to NORM.
Observe SYS 1 and SYS 2 discharge valves position indicators FWD and AFT at OPEN.
Repeat actions with DISCHARGE VALVES SYS 1 and SYS 2 at AFT SHUT.

Observe cabin rate of climb indicator reads 0.

Engine warning lights .... TEST

Observe ENGINE O/HEAT lts (4), START PUMP lts (4), WIND DOWN lts (4), REHEAT lts (4) and NAC/WING O/HEAT lts (4) off.
Press to test FUEL FILTER lts (4), one at a time
Observe FUEL FILTER lts (amber) on, MWS ENG(amber) on.

Fuel heaters .... AUTO

Verify FUEL HEATERS sels (4) at AUTO.

Engine recirculation valves .... SHUT

Verify ENGINE RECIRCULATION VALVES sws (4) at SHUT.

Take-off CG sw .... NORMAL

Verify that the Take-Off CG sw is at NORMAL and is guarded.

ENG 4 T/O N1 limiter sw .... NORMAL

Set the ENG 4 T/O N1 LIMITER sw to NORMAL

GRD IDLE sws .... HI

Set the ENG 1 & 4 and ENG 2 & 3 sws to HI

Engine control schedule .... SET

Set the ENGINE CONTROL SCHEDULE sel to AUTO and the rty sel to FLYOVER (F/O) or NORMAL.
Observe the ENGINE CONTROL SCHEDULE LO lts (4) (green) on.

NOTE

FLYOVER (F/O) is selected for noise abatement take-off and NORM if noise abatement is not required.

(Unchanged)

Secondary air doors .... SHUT

Verify SECONDARY AIR DOORS sels (4) at SHUT.
Observe secondary air door MIs (4) read SHUT.

Secondary nozzle .... CHECK

Observe SECONDARY NOZZLE instruments (4) for condition.

Flight rev arm .... OFF

Observe FLIGHT ARM OPEN lt off.

Nozzle angle scheduling unit test sel .... NORMAL

Verify NASU test sel at NORMAL.
Observe NOZZLE light off.

Flight instruments .... CHECK

Observe for correct repetition of readings on pilots panels.

Engine instruments .... CHECK

Observe TCA TEMP pointers (4) at sensible values and high TCA TEMP lts (4) off.
Observe FUEL TEMP pointers indicate sensible values and high FUEL TEMP Lts (4) off.
Observe OIL ENG pointers (4) indicate 0 psi and low OIL ENG lts (4) (red) on.
Observe OIL TEMP pointers (4) show sensible values and high OIL TEMP lts (4) off.
Observe OIL CONT pointers (4) show sensible values and high OIL CONT lts (4) off.
Observe P7 pointers show sensible values and agree with their lower digital counters. No warning flag visible across lower digital counters.

Engine vibration .... ON/TEST

Press and release MWS CANCEL pb.
Observe MWS warning lts off.
Verify ENGINE VIBRATION sel at SUPPLY 1 and FRONT/REAR sws (4) at FRONT.
Observe ENGINE VIBRATION lts (8) off and ENGINE VIBRATION instrument pointers at 0.

PRESS VIBRATION INDICATOR TEST pb.
Hold ENGINE VIBRATION TEST sel at Test.
Observe - engine vibration lts (4) (white) and (4) (amber) on.
- engine vibration instrument pointers (4) move to top of scale
- MWS ENG (4) (amber) on.

Release VIBRATION INDICATOR TEST pb.
Set ENGINE VIBRATION TEST sel to RESET and release.
Observe - engine vibration lts (8) off
- engine vibration instrument pointers (4) at 0
- MWS ENG (4) off

The above procedure tests both the 5 ins/sec and the 10 ins/sec warnings

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Set ENGINE VIBRATION sel to SUPPLY 2
SET FRONT/REAR sws (4) to REAR
Press VIBRATION INDICATOR TEST pb
Hold ENGINE VIBRATION TEST sel at TEST
Observe - engine vibration lts (4) (amber) on
- engine vibration instrument pointers (4) above 4 ins/sec
- MWS ENG (4) (amber) on.

Release VIBRATION INDICATOR TEST pb.
Set ENGINE VIBRATION TEST sel to RESET and release
Observe - engine vibration lts (4) off
- engine vibration instrument pointers (4) at 0
- MWS ENG (4) off.
Set FRONT/REAR sws (4) to FRONT.

The FRONT/REAR sws should be set to the FRONT position except when specifically checking rear vibration levels.

The appropriate front bearing or jetpipe warning light will always appear whenever the associated level of vibration is exceeded irrespective of the FRONT/REAR switch setting.

A front vibration level between 2.5 and 5 ins/sec or a front vibration showing a sustained increase of more than 1 in/sec must be reported.

Warning test (engine instruments) .... CHECK

Press to test OIL TEMP WARNING TEST pb.
Observe OIL TEMP instruments warning lt (amber) on and MWS ENG ambers on.

Press to test FUEL TEMP WARNING TEST pb.
Observe FUEL TEMP instruments warning lts (amber) on, and MWS ENG ambers on.

Air bleed control panel ....CHECK/SET

Observe DUCT lts, FUEL EXCH lts, SEC EXCH lts, PRIM EXCH lts and OVER PRESS lts off.

Set BLEED VALVES sws to OPEN. Press to test the OVER PRESS lts in turn.
Observe OVER PRESS lt (amber) on, MWS AIR lt (amber) on.

Observe BLEED VALVES MIs (4) show crossline.
Observe bleed pressure gauges (4) read 0 approx.

Set BLEED VALVES sws to SHUT.

Set 2 and 3 CROSS BLEED Sws. to OPEN.
Verify 1 and 4 CROSS BLEED sws. at SHUT.
Verify CROSS BLEED MIs show crossline
Verify COND VALVE sels at OFF.
Observe COND VALVE MIs show crossline.

Observe JET PUMP MIs show crossline and RAM AIR MIs show inline.

Observe FUEL VALVE sels are at AUTO and guarded and FUEL VALVE MIs show inline or crossline.

NOTE
On the ground, any valve may be in either position, depending upon the respective fuel and air temperatures.

Observe TEMP VALVE position indicators (4) read C approx.

Equipment bay cooling panel ....SET

Confirm sws and sels set.

Fuel management panel ....CHECK/SET

Observe M lt (amber), U/FULL lts (yellow) and LOW LEVEL lts (amber) on or off, "ENGINE FEED PUMPS" "LOW PRESS" lts (yellow) on, ACC lts (yellow) on, engine inlet LOW PRESS lts (amber) on or off and all other indication lts off.

Observe REFUEL MI reads GRD.

Observe FQI for tanks 1 to 8 inclusive show failure flags.

(Unchanged)

Observe the digital indicators on the FQI for tanks 9, 10 and 11 are obscured by black flags.

Verify tank 9 INLET VALVE MAIN sels at AUTO and O/RIDE sels at OFF.
Observe tank 9 INLET VALVE MIs show crossline.
Verify tank 9 PUMP sels at AUTO.
Verify tank 10 DE-AIR sw at OFF.
Observe DE-AIR MI reads OFF.
Set tanks 9 & 10 load limit control to zero.
Verify tank 10 PUMP sels at AUTO.

Verify FQI test rty sel at OFF. Observe on CG & CG indicator, cg limit bugs FWD and AFT are at approximately 51.8% and 53.8%. Flag visible on M selection whilst refuelling. Verify CG channel rty sel at M.

**Verify TANKS 1 & 4 sw at NORM.
Observe TANKS 1 & 4 MI reads NORM.**

Observe no failure flags visible on TOTAL CONTENTS indicator.

NOTE

The TOTAL CONTENTS indicator will be increasing during refuelling but the apparent rate will be incorrect as only the fuel flowing into tanks 9,10 and 11 is indicated.

Verify TOTAL FUEL REM and A/C WEIGHT rty sel at N. Press and hold left hand knob.
Observe TOTAL FUEL REM digital indicators (4) read 8s and A/C WEIGHT digital indicators (5) read 8s. Release the left hand knob.

Verify tank 11 INLET VALVES MAIN sel (2) at AUTO and OVERRIDE sels (2) at OFF.
Observe tank 11 right hand inlet valve MI shows crossline and left hand inlet valve MI shows in accordance with refuelling.

NOTE

During refuelling the tank 11 left hand inlet valve is used as a refuelling valve and controlled by a switch on the refuel control panel.

Verify tank 11 PUMP GREEN sel and PUMP BLUE sel at AUTO
Verify tank 11 left and right hand PUMPS sels at AUTO.
Verify tank 11 DE-AIR sw at OFF.

Observe tanks 1,2,3 and 4 jettison valve MIs show crossline.
Observe JETTISON MASTER VALVES MIs (2) show crossline.

Set FUEL TEMP rty sel to positions 2, 3 and 4 in turn and return to 1.
Observe fuel temperature indications for TANK and ENG show sensible readings at each position.

NOTES

Each numbered position refers to the fuel feed system of the selected engine. TANK indicates the temperature of the fuel upstream of the air conditioning and hydraulic heat exchangers i.e. the tank temperature.

ENG indicates the temperature downstream of these heat exchangers i.e. the engine inlet temperature.

Verify tanks 5,6,1,2,3,4,10,7 and 8 STANDBY INLET VALVES sws at SHUT.
Observe tanks 1,2,3,4 and 10 STANDBY INLET VALVES MIs (5) read in accordance with refuelling.

NOTE

During refuelling the standby inlet valves are used as refuelling valves and are controlled by switches on the refuel control panel.

Verify the FUEL LP PROTECTION sw at ARMED.
Observe the HYD/COND FUEL EXCH BY-PASS MIs (4) show black or read OPEN.

Verify tank 5A PUMPS sws (2) and tank 7A PUMPS sws (2) at OFF.

Verify TRIM PIPE DRAIN sw at SHUT.
Observe LH and RH MIs read SHUT.
Observe SCAVENGE PUMP MI reads ON or OFF.

NOTE

During refuelling, the scavenge pump may or may not be operating.

Verify TRANS VALVE 5A-5 sw and TRANS VALVE 7A-7 sw at SHUT.
Observe TRANS VALVE 5A-5 MI and TRANS VALVE 7A-7 MI show crossline.
Verify tank 5 and tank 7 PUMPS sel at OFF and guarded and tank 5 and tank 7 PUMPS sw at OFF.

Verify tank 5 and tank 7 INLET VALVE MAIN sel at AUTO and O/RIDE sel at OFF.
Observe tank 5 and tank 7 INLET VALVE MI show crossline.

Verify tank 6 and tank 8 PUMPS sws (2) at OFF.

Verify INTER-CON VALVE (6-7) sw and INTER-CON VALVE (5-8) sw at SHUT.
Observe INTER-CON VALVE MIs read SHUT.

Verify ENGINE FEED PUMPS sws (12) at OFF.
Verify engine LP VALVE sels (4) at OPEN and guarded.
Observe LP VALVE MIs show inline and pea lts off.

Verify engine CROSSFEED vlv sels (4) are crossline.

Unchanged

Observe CROSSFEED MIs show crossline.

Pull, turn anti-clockwise and release the number 1 engine FUEL CONSUMED indicator reset/test knob.
Observe the digital indicator reads 0 at the least significant figure and blanks in the other spaces.
Repeat for engines 2,3 and 4.

Press to test, in turn, the LEAK lts (4).
Observe the LEAK lt (red) on, MWS ENG 1 (2,3 and 4) lt (red) on.

Observe, on TANK PRESSURE gauge, no failure flag is visible.

Temperature control panel .... CHECK/SET

Observe LEAK lts (4) off.
Observe CAU IN temp gauges (4) and DUCT temp gauges (4) show sensible readings.
Observe MASS FLOW gauges (4) are indicating 0.

Observe GROUP 1 sw at ON and guarded and group 1 MI shows a vertical line from group 1 to FLIGHT DECK.
Observe GROUP 2 sw at ON and guarded and group 2 MI shows a line from Group 2 to FWD CABIN.
Observe GROUP 3 or 4 sw at ON and guarded and group 3 or 4 MI shows a line from group 3 to REAR CABIN.
Observe COMPARATOR lt is off and that FLIGHT DECK, FWD CABIN and REAR CABIN temps show sensible readings.

Rotate group 1 temperature sel to AUTO and NORMAL and repeat for groups 2,3 and 4.

Hydraulic management panel ....CHECK/SET

Observe green system, yellow system and blue system reservoirs L/PRESS lts off.

CAUTION
To prevent cavitation of the engine-driven hydraulic pumps the three reservoirs must be pressurized.

IF ...one or more L/PRESS lt(s) (yellow) on
Press AIR COMP pb.

NOTE
One cycle of the air compressor is normally sufficient to pressurize the three reservoirs.

CAUTION
After operating the air compressor twice, wait 10 minutes cooling time before operating again.

Observe green, yellow and blue system O/HEAT lts and

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L/LEVEL lts off.

Observe on the GREEN, YELLOW and BLUE system reservoir contents gauges that the pointer indicates within the green bands and no failure flags are visible.

Observe the SHUT OFF VALVES MIs (6) read OPEN.

Set the green system pump sels 1 and 2 and blue system pump sels 3 and 4 to OFF.
Observe the guard against SHUT is wirelocked and PUMPS MIs read OFF.
Observe yellow system pump sels 2 and 4 at AUTO, guarded and yellow system PUMPS MIs read ON.

Observe HYD TEMP indication is in normal range on a selected reservoir.

NOTE
Normal hydraulic temperature range is below 60 deg C but may be up to 90 deg C on short transit.

Repeat temperature check for the other two reservoirs using the HYD TEMP rty sel.
Observe hyd pump L/PRESS lts (6)(amber) are on.

Observe GREEN, YELLOW and BLUE systems pressure gauges, pointers at 0 and no failure flags visible.

Observe YELLOW PUMPS sw is at NORM and guarded.

Electrics panel ....CHECK/SET

Observe CSD high inlet temperature lts (4) off and no failure flags visible.
Observe CSD disconnect sws (4) at NORM, guarded and locked.

NOTE
If a CSD has been disconnected, it can be reset only on the ground with the engine stopped. Thus, if a switch is not at NORM a, ground engineer check must be made before engine start.

Observe CSD lts (4)(amber) on.
Observe KW KVAR Meters (4) condition and reading 0.

Verify generator sels (4) at ON.
Observe generator control breaker MIs(4) show crossline.
Observe GEN lts (4) (amber) on.

Observe AC MAIN BUS lts (4) off.

Verify the parallel PUSH TO ARM pb lt is in the disarmed position.
Verify BTB sels (4) at NORM and guarded.
Observe BTB MIs (4) show inline.

(Completely Revised)

FLIGHT ENGINEERS COCKPIT PREPARATION ⑭

Observe the SSB MI shows inline.

NOTE
The SSB must be closed or no supply will be available to the cockpit.

Observe ess main isolate MIs shown inline.
Observe AC ESS BUS lts (4) off.

Verify EMERG GEN isolate sw at NORM and guarded.

NOTE
The NORM position arms the emergency generator for subsequent automatic operation.

Verify EMERG GEN control sel at AUTO.
Observe O/HEAT lt off
Observe EMERG GEN SELECTED lt and EMERG GEN FAIL lt off
Observe EMERG GEN KVA meter condition and indicating 0.

Observe auto shed breaker MI shows crossline.
Observe No.1,2,3 and 4 d.c. ammeters indicate loads.

NOTE
The four TRUs are identical. The d.c. busbars supplied by them are normally connected together but the TRU ammeter readings may differ.

Observe ess main split MIs (2) show inline.
Observe DC ESS BUS lts (2) off.
Observe DC MAIN BUS lt off

Set the left hand battery sel to BATT ON, then to BATT OFF.
Observe BATT ISOLATE lt (amber) on, MWS ELEC lt (amber) on.

NOTE
This tests the BATT ISOLATE light and its connection to the master warning system.

Repeat this test for the right hand battery sel.

Verify GEN 1 & 3 and GEN 2 & 4 GALLEYS sws (2) at ON.
Verify WATER HTRS sw at ON.

Centre & Aft Lights ....TEST

Select and hold, in turn, the Centre Lights and Aft Lights sel to TEST.
Observe, on the associated section of the Flight Engineers panel, all warning lights on.
Release sels to HI or LO as required.
Observe lights return to system status.

FLIGHT ENGINEERS COCKPIT PREPARATION ⑭

Radiation meter ....TEST

On radiation indicator.
Observe no flag visible, pointer at a low reading and no warning lts on.

Press and hold TEST pb.
Observe pointer moves into red sector, amber lt on at 10, red on at 50, MWS RAD'N (red) on at 50, and millerems counter display operates.

NOTE

It may be necessary to hold the TEST pb in the pressed position for nearly a minute to activate the counter display.

Release TEST pb.
Observe pointer returns to a low readinq, red lt off at 50, MWS RAD'N off at 50 and amber off at 10.
Record millirems reading shown on counter.

Fuel management (refuelling completed)........................CHECK/SET

Observe REFUEL MI reads FLT.

Observe standby inlet valves MIs for tanks 1,2,3,4 and 10 read SHUT.

NOTE

Once refuelling is complete and the REFUEL MASTER selector is set to OFF/DEFUEL, control of all the standby inlet valves reverts to the STANDBY INLET VALVES switches.

Observe SCAVENGE PUMP MI does not read ON permanently.

NOTE

The scavenge pump may be running due to normal leakage of fuel into the vent system. The MI must be monitored to ensure that the pump switches off at intervals.

Rotate the FQI test rty sel to GAUGES.
Set and hold the FQI test sel to TEST.
Observe that quantity indications increase, for tank 11 by 3000 kg, for tanks 9,10,5,6,7 and 8 by 500 kg, for tanks 5A,7A,1,2,3 and 4 by 200 kg and TOTAL CONTENTS indication increases by approximately 7200 kg.
The CG% CO indicators (2) show approx. 1% aft movement.
The CG% CO indicator lights (red) on
The CG digital display shows approx 1% aft movement.
The machmeter (2) bugs move such that the AFT bug comes on scale and the FWD bug shows a higher Mach number.

(Complete, Revised)

FLIGHT ENGINEERS COCKPIT PREPARATION

NOTE

If the actual CG is forward of 52.7% the Machmeter AFT bug will not come on scale. If the actual CG is aft of 53% then it is likely that the aft CG movement indication will activate the aft normal boundary warning i.e. the M/CG lts (red) on, the CG indicator pea lts (red) on and the MWS M/CG (red) on. **If the CG movement is insufficient to activate the warnings, the warnings may be activated by adjusting the ZFCG selector.**

Release the FQI test sel.
Observe the FQI and c.g. indications return to their original readings and all warning lts off.

Rotate the FQI test rty sel to MIN A, set and hold the FQI test sels to TEST.
Observe the appropriate 9,10 and 11 lts (yellow) on.
Set the FQI test sel to CANCEL and release.
Observe the 9,10 and 11 lts off.
Repeat the last two actions for MAX A, MAX B and MIN B.

Rotate the FQI test rty sel to 1 CG.
Rotate the CG channel rty sel to 1.
Set and hold the FQI test sel to TEST
Observe CG channel 1 lt (amber) on, MWS CG (amber) on and channel A 11 lt (yellow) on. (channel A 9 and 10 lts (yellow) may also be on).
Tanks 1, 2, 5, 5A and 6 contents indication increases.
The CG digital display shows approx 1% aft movement.
On captain's and first officer's machmeters the CG failure flag is visible and the bugs move as in the GAUGES test.
On captain's and flight engineer's CG% Co indicators failure flag visible,
Rotate the FQI test rty sel to MAX A.
Set the FQI test sel to CANCEL and release
Observe CG channel 1 lt off and channel A,9,10 and 11 lts off
Observe the FQI and c.g. indications return to their original readings and all warning lts off.
On captain's and first officer's machmeters CG flag not visible and bugs return to their original position.
On captain's and flight engineers' CG% Co indicator no failure flags.

(Deletion)

Repeat the test with FQI test rty sel at 2CG for CG channel 2, CG channel rty sel at 2 and with reference to tanks 4,3,7,7A and 8.

Rotate the FQI test rty sel to MIN B.
Set the FQI test sel to CANCEL and release.

Rotate the FQI test rty sel to FIL CG, set and hold the FQI test sel to TEST.
Observe the c.g. display reads 88.8.
Release the FQI test sel and rotate the FQI test rty

sels to OFF.
Observe CG digital display is within tolerance
Rotate the CG channel rty sel to 1
Observe CG digital display is within tolerance
Rotate the CG channel rty sel to M
Observe CG digital display is within tolerance

NOTE

The CG digital display reading at 1,2 and M should be within 0.2% of each other, or the reading at 1 and 2 should be equidistant about the reading at M with the tolerance compatible with the fuel balance of the left and right hand contents.

Observe tank 11 left hand INLET VALVES MI crossline.
Observe FQI for tanks 1 to 8 inclusive do not show failure flags and FQI for tanks 9,10 and 11 do not have digital indicators obscured.

NOTE

Once refuelling is complete and the REFUEL MASTER selector is set to OFF/DEFUEL control of tank 11 left hand inlet valve reverts to AUTO setting of the INLET VALVES MAIN selector and signals from the fuel quantity packs are restored to the flight deck FQI. The M lt (amber) may be on, indicating a CG discrepancy until all the FQI agree with their tank contents.

Observe individual tank quantities agree with the refuelling sheet (plus or minus 2%).
Observe the TOTAL CONTENTS indicator agrees with the refuelling sheet (plus or minus 2%) and that the pilots' TOTAL CONTENTS indicator repeats the indication.
Sign the refuelling sheet.

GREEN GO LIGHTS ....CHECK

(Deletion)

Set P7 gauge indices below gauge reading.
Set Engine Fuel Flow gauge indices to maximum.
Arm T/O Monitor.
Observe four green lights on.
Reset controls as required.

Captain's documentation stowage ....CHECK

Check the contents on the Flight Equipment Check List (Navigation Manual Section 8).

Lighting panel (left) ....AS REQUIRED

Set LH DASH INSTRUMENTS and LH & CENTRE DASH FLOOD rty sels to required settings.
Observe lighting as selected.
Press CHART LIGHT pb and set rty sel as required.
Observe light as selected.
Set COMPASS lt sel as required.
Observe lt as selected.
Set STOWAGE FLOOD sw as required.
Observe lts as selected.
Select and hold D/B LIGHT sel at TEST.
Observe on left hand dash panel all lights on.

Release D/B LIGHT sel to HI or set to LO as required.
Observe lts return to system status.
Set SIDE CONSOLE rty sel to required setting.
Observe lighting as selected.
Set DIGITS rty sel to required setting.
Observe lighting as selected.

Seat .... SET

With the seat in its fully forward position, adjust the elevation such that it is just possible to scan along the top plane of the centre glareshield.
Observe the W/SHIELD DE-ICE and VISOR DE-ICE O/HEAT lights are within vision.

Oxygen (mask) ....TEST

On the associated audio selector panel set RT/INT sw to INT.
Press INT pb lt.
Observe INT pb lt (white) on.
Rotate BOOM/MASK rty sel to MASK and don headset.
Observe, on mask stowage panel, blinker indicator shows black.
Push down and hold RESET/TEST slide control at TEST.
Observe blinker indicator shows yellow cross, then shows black.
With RESET/TEST control slide still held at TEST, squeeze the red levers.
Observe blinker indicator shows yellow cross, then shows black.
With RESET/TEST slide controls still held at TEST, verify N/100% sw at 100%.
Press, momentarily, TEST pb.
Observe the sound of oxygen flowing over the mask microphone.
Release RESET/TEST slide control and verify white area not visible.
Observe blinker indicator shows black.

CAPTAIN'S COCKPIT PREPARATION ①

On the associated audio selector panel, rotate BOOM/MASK rty sel to BOOM. Remove headset.

INS 1,2 and 3 ....PRESENT POSITION CHECK
DME STATION DATA
INSERTED AND VERIFIED
/SET WAYPOINTS

Position INS 1 data selector to POS. Record displayed present position on captain's flight log. Cross check recorded position with listed ramp position in the Aerodrome Folder.

To insert DME station data in both INS simultaneously press REMOTE key on both INS 1 and INS 2. Insert DME data card into card insertion slot of ADEU. The coded side of the card must be facing fwd and the heavy black line on the left.

NOTES

The READ light on the ADEU illuminates as the card is taken into the ADEU and extinguishes when reading is complete.

If the DME station data has been loaded using the REMOTE function the following verification procedure need only be carried out on the receiving INS.

Set waypoint/DME selector on INS 1 to desired DME station number.
Set data selector to WAY PT. Press keys 7 and 9 simultaneously.
Verify that the correct latitude and longitude appear in the left and right data displays respectively.
Press keys 3 and 9 simultaneously.
Verify that the correct altitude of the DME station in thousands of feet and frequency of the DME station in MHz appear in the left and right displays respectively. Repeat for each DME station for which data has been inserted. Repeat for INS 2 unless the REMOTE function has been used.

To regain waypoint display instead of DME station data display, set data selector to POS then back to WAY PT.

If remote loading of waypoints into all units is desired, press REMOTE switch on each control display unit; check that each REMOTE switch light illuminates.

Position waypoint selector to 1 on each control display unit.

Press switch for north (N2) or south (8S) latitude as appropriate. Press numbered switches in sequence for waypoint latitude. Check correct latitude in left data display. Press INSERT switch; check that INSERT light

(Unchanged)

extinguishes.

Press switch for west (W4) or east (6E) longitude as appropriate. Press numbered switches in sequence for waypoint longitude. Check correct longitude in right data display. Press INSERT switch; check that INSERT light extinguishes. Reposition waypoint selector for each successive waypoint (insert at least three way-points). Cross-check the IN leg distances with the Flight Log. If remote loading has been used, press each REMOTE switch to extinguish REMOTE lights. If more than nine waypoints are required, remaining waypoints will be loaded in place of first waypoints, when the latter are no longer in use.

Position each control display unit AUTO/MAN switch to AUTO to establish automatic navigation leg switching.

STEERING LIGHT .... ON

Observe STEERING lt on.

AUTOLAND light .... OFF

Observe AUTO LAND lt off.

RAD/INS switch .... RAD

Set RAD/INS sw to RAD

VHF/NAV controller .... CHECK/SET

Set captain's HSI course pointer to the lubber line.
On captain's VHF/NAV controller:
Set local ILS frequency
Set and hold TEST sel at VOR-UP/L
Observe on captain's ADI:LOC and G/S flags appear, Localiser and Glide indexes out of view.
Observe on captain's HSI: LOC, G/S and Navigation flags appear, beam bar and Glide indexes unchanged.

After approx. 6 Seconds:

LOC, G/S and Navigation flags disappear, Loc index moves to left stop on ADI and beam bar moves approx. one dot left on HSI; Glide indexes one dot up; ANG appears on HSI.

After approx. 12 seconds:

LOC, G/S and Navigation flags reappear. On ADI, Loc and Glide indexes out of view.
Release TEST sel.
Observe on captain's ADI and HSI, if aircraft is in range of ground station:
LOC, G/S and Navigation flags disappear.
LOC and Glide indexes appear.
Beam bar at original position and ANG appears on HSI.
Repeat actions with TEST sel held at DME-DN/R and check localiser and glideslope indications.

Set captain's HSI course pointer to zero degrees.
Set a local VOR frequency.
Observe on captain's ADI: LOC and G/S flags and indexes out of view.
Observe on captain's HSI: G/S flag and index out of view.
Observe on VOR-RMI s: correct VOR 1 indication.
Set and hold TEST sel at VOR-UP/L.
Observe on captain's HSI:
Beam bar central, Navigation flag in view.

After approx. 6 seconds:

Mavigation flag disappears and ANG appears; FROM pointer appears and beam bar centres.

After approx. 12 seconds:

FROM pointer disappears and Navigation flag reappears.
Observe on VOR-RMI s, upon selecting VOR-UP/L:
VOR 1 pointers move to S on compass cards and VOR 1 flags appear.
After approx. 6 seconds VOR 1 flags disappear.
After approx. 12 seconds VOR 1 flags reappear.
Release TEST sel.
Observe all indications return to original conditions.

Set DME sel to DME.
Observe on DME Indicators that correct DME 1 information is displayed.
Set and hold TEST sel at DME-DN/R.
Observe for the first second, DME 1 indicators blank.
for 2nd second, four dashes.
for 3rd second, 000.0 (+0.1 - 0).
Release TEST sel and check DME 1 indications return to original condition.

AFCS panel ....CHECK

Verify AT 1, AT 2, FD 1, AP 1, AP 2 and FD 2 sws all at OFF.
Observe all warning lts off on both landing display. indicators.

Autothrottle .... CHECK

Set AT 1 sw to engage.
Observe sw remains engaged, IAS HOLD pb lt (white) on and throttle levers move from the idle position.

Set AT 2 sw to engage.
Observe sw remains engaged.

(Deletion)

Press AT instinctive disconnect pbs (2) on No. 1 or No.4. throttle levers.
Observe AT 1 and AT 2 sws drop to OFF, IAS HOLD pb lt off and AT 1 lt (red) flashing on both warning and landing display indicators.

Press again the AT instinctive disconnect pb.
Observe AT lt (red) off on both warning and landing display indicators.

Retard throttle levers (4) to the idle position.

PULL UP light (pre-mod TERRAIN light) ....OFF

Observe light is off.

M/CG light ....OFF

Observe M/CG lt off.

Warning and Landing Display ....TEST

Press and hold TEST pb.
Observe AP light (red), AT light (red), ILS boundaries exceedence warnings (white). aircraft symbol (amber) and LAND 2 and LAND 3 lts (green) and DH lt (amber) on.
Observe, on first officer's warning and landing display, AP light (red) AT light (red) ILS boundaries excedence warnings (white) and aircraft symbol (amber) on.
Observe brief audio warning (cavalry charge) and captain's and first officer's AUTOLAND lt (red) on.
Release TEST pb.
Observe all lts off.

IF .... AP light (red) on and/or AT light (red) flashing,
Press associated instinctive disconnect pb to cancel
Observe AP and AT lts off.

NOTE

With the autopilots and autothrottles disengaged a true disengagement warning will be observed when the TEST pb is released.

R NAV ....OFF

Observe the R NAV, TK O/S and VOR FQY lts are off.
Observe the DEV SENS MI reads LOW.

RADAR light ....OFF

Observe WX RDR lt off.

Instrument transfer switches ....SET

Verify ATT sw set at ATT/INS 1, COMP 1/COMP 2 sw at COMP 1. DEV 1/DEV 2 sw at DEV 1 and NAV sw at INS 1.

NOTE
The normal position of the captain's instrument transfer switches is to the left.

ASI ....CHECK/SET

Verify ASI mode sw at N.
Observe mode flag reads ADC and no failure flags visible on ASI.

ADI ....CHECK

Press and hold TEST pb.
Observe flag G visible, sphere moves 10 deg pitch up and 10 deg right bank on captain's ADI and CHECK ATT lts (amber) on both ADIs.

Release TEST pb.
Observe sphere returns to initial attitude on captain's ADI.
Observe G flag not visible, and CHECK ATT lts off on both ADIs

VSI ....CHECK

Observe no failure flags visible on VSI.

Radio altimeter ....CHECK/SET

Observe that red fail flag is out of view.
Rotate the DH setting knob to the detent (below zero feet) on the captain's and first officer's radio altimeter indicators.
Observe radio altimeter pointer indicates between minus 5 ft and minus 12 ft.
Observe on both ADIs, runway symbol is indicating aircraft height and red ALT flag is out of view.
Observe DH lts off on both ADIs and the warning and landing display.
Press and hold TEST pb.
Observe pointer indicates 100 ft and red fail flag in view.
On first officer's ADI, observe runway symbol out of view and ALT flag in view.
Release TEST pb.
Observe red fail flag disappears, pointer rotates past 2500 ft behind the mask, then returns to below zero.
Observe, on first officer's ADI: the runway symbol appears and the ALT flag disappears.
Observe a continuous 800 Hz audio warning sounds and the DH lts remain off.
Rotate DH setting knob to set bug to 20 ft.
Observe the audio warning ceases and the DH lts illuminate on both ADIs and the warning and landing display.
Press the DH setting knob and observe all DH lts off.

Standby horizon ....CHECK/SET

(Unchanged)

Observe no flag visible on standby horizon.

NOTE
The failure warning flag disappears after power on. Allow at least 50 seconds after power on in order to have true indications.

Pull standby horizon knob.
Observe pitch and roll attitude goes to zero.
Release standby horizon knob.
Observe standby horizon shows aircraft attitude.

NOTE
A period of 30 seconds may be necessary to obtain a correct stabilization.

Markers ....TEST

Press and hold marker lts TEST pb.
Observe captain's and first officer's marker lts,
OUTER lts (blue) on, then off, audio while lts on.
MIDDLE lts (amber) on, then off, audio while lts on.
AIRWAYS lts (white) on, then off, audio while lts on.
Release the TEST pb

Incidence and Accelerometer ....CHECK

Observe no failure flags visible on the incidence indicator.

Standby ASI/Machmeter ....CHECK

Observe condition of Standby ASI/Machmeter

Machmeter ....CHECK

Observe no failure flags visible on the Machmeter.

HSI ....CHECK/SET

Pull No. 1 HDG/TRK rty sel to the HDG position.
Rotate No. 1 HDG/TRK rty sel to the left or right.
Observe the corresponding heading is displayed on the AFCS panel and on the captain's HSI; the heading index indicates the heading selected and HDG is displayed.
Observe MAG, RAD and 1 visible.
Press and hold TEST pb.
Observe HDG alarm flag visible, compass rotates, 8888 visible in MILES and GND SPD displays and HDG lt (amber) on in captain's and first officer's HSIs.
Release TEST pb.
Observe, HDG flag disappears, compass indicates a correct heading, 0000 visible in GND SPD displays and HDG lt off on both HSIs.

(Unchanged)

FD1/FD2 switch FD1

Set FD1/FD2 sw to FD1 and observe FD1 visible on ADI.

CAPTAIN'S COCKPIT PREPARATION ⑤ ⑥

Altimeter .... CHECK/SET

Verify, on altimeter, mode sw at N.
Observe mode flag reads ADC and no failure flags visible on altimeter.
Rotate static pressure knob to set the airfield QNH in the corresponding windows and check the altimeter reads within plus or minus 35 feet of the airfield elevation.
Set bugs to airfield elevation and 3 eng. acceleration height.

Clock .... SET

To adjust the GMT display,
- set the Timer/Chro switch to CHRO
- set the GMT sel. to FAST or SLOW as required.

When the correct time is established,
- set the GMT sel. to RUN.

To zero the Elapsed Time display,
- set the Elapsed Time sel. to RESET then to STOP.

To set a countdown time in the Chrono display,
- set the Timer/Chro switch to TIMER
- set the GMT sel. to FAST or SLOW as required.

When the countdown time in mins & secs is established
- set the GMT sel to RUN.

Engine rating lights .... CHECK

Observe T/O lt on.

DME .... CHECK

Observe sensible readings.

VOR/RMI .... CHECK

Observe no flags visible on VOR/RMI if a VOR station in range.

Side slip .... CHECK

Observe no failure flags visible on SIDE SLIP indicator.

ADF/RMI .... CHECK

Observe no heading failure flag visible on ADF/RMI.

INS monitor lights .... CHECK

Observe INS 1, INS 2 and INS 3 lts on and INS COMP lt OFF.

TEMPERATURE .... CHECK

Observe no failure flags visible on temperature indicator.

C.G. indicator .... CHECK

Observe no failure flag visible on C.G. indicator.

(Standby altimeter (Post mod) .... SET)
(Rotate static pressure knob to set 29.92ins, then leave as set)
(for the duration of the flight.)
( )
(Cabin altimeter (Premod) .... CHECK)

Radar .... SET

CAUTION

The radar must not be selected on while the aircraft is being refuelled. It must not be operated, except in STBY or TEST mode, when any refuelling operation is taking place within 100 yards of the antenna.

Verify SYSTEM rty sel at 1
Press the STBY pb lt and observe STBY lt (white) on.
Verify TILT sel at 5 deg UP.
Rotate GAIN control to AUTO.
Rotate RANGE rty sel to 100
Rotate RANGE MARKS control as required.
Move the polaroid filter to the left stop
Set the IND OFF/LEFT/AHEAD/RIGHT rty sel to AHEAD.

If a radar test is required.

Rotate INT knob fully counter-clockwise.
Press TEST pb on radar controller and observe TEST lt (white) on and STBY lt off.
Rotate INT knob clockwise until correct TEST pattern appears.

NOTE

A 3-minute warm-up period should be allowed before checking radar display.
Due to the integrating properties of this type of indicator, it is important to appreciate that the effect of adjusting the intensity (brilliance) will be fully apparent only after approximately four to five azimuth sweeps.
The assessment of any adjustment should be made only after this condition has been met.
Under normal conditions a satisfactory display will be obtained with the INT control set between the 10 o'clock and 2 o'clock positions.
Too high a setting of the INT control will result in "blooming" and severe loss of definition.

Press the STBY pb lt
Observe STBY lt (white) on and TEST lt off.

Emergency flight control system ....CHECK

Observe EMERG CONT pb lt off and disc unbroken.

Air data computer No. 1 ....CHECK

Observe ADC1 and TEST lts off and no failure flags visible on associated instruments.

CAPTAIN'S COCKPIT PREPARATION

Set ADC 1 TEST rty sel to 1.
Observe ADC 1 lt (amber) on, audio warning (two tones), stick shaker operating, and MWS ADC (amber) on.

As soon as the stick shaker operates
Set ADC 1 rty sel to NORM,
When the instruments stabilize.
Press to reset the ADC 1 lt (amber) and observe instrument readings return to previous values, and no failure flags visible, MWS ADC lt off, no audio warning, TEST lt off, ADC 1 lt off.

NOTE

This is a minimal check required to test the stick shaker, for a full ADC check see Conditional Procedures.

Briefing ....AS REQUIRED

Brief as required.

First Officer's documentation stowage ....CHECK

> Check contents as the First Officer's checklist (Navigation Manual Section 8).

Seat .... SET

With the seat in its fully forward position, adjust the elevation such that it is just possible to scan along the top plane of the centre glareshield.
Observe the W/SHIELD DE-ICE and VISOR DE-ICE O/HEAT lights are within vision.

Stab, feel and trim panel ....SET

Verify AUTO STAB No.1 PITCH, ROLL and YAW sws at OFF.
Verify AUTO STAB No.2 PITCH,ROLL and YAW at OFF.
Verify ARTIFICIAL FEEL No.1 PITCH, ROLL and YAW at OFF.
Verify ARTIFICIAL FEEL No.2 PITCH, ROLL and YAW at OFF.
Verify ELECTRIC TRIM No. 1 and No. 2 sws at OFF.

Flight control inverters ....ON

Set BLUE INVERTER sel to ON.
Observe BLUE INVERTER FAIL lt off.

Press to test BLUE INVERTER FAIL lt.
Observe FAIL lt (red) and MWS PFC lt (red) on.

Repeat actions for GREEN INVERTER.

Flight control selection ....GREEN

Verify OUTER AND MIDDLE ELEVONS sel and INNER ELEVONS sel at GREEN.

Observe MECH JAM lt (red) on.

NOTE

The MECH JAM light is on because, with no hydraulic pressure, the elevons droop, thus introducing loads into the mechanical linkage that are sensed as a jamming of the linkage.

Verify RUDDER sel at GREEN,

Anti-Stall ....ON

Verify ANTI STALL SYSTEM 1 sw at ON.
Observe SYS 1 FAIL lt (amber) on.

NOTE
The FAIL light is on because the pitch auto-stab is off.

Repeat the action for ANTI STALL SYSTEM 2.

W/SHIELD DE-ICE MI ....OFF

Observe W/SHIELD DE-ICE MIs L and R read OFF.

Landing lights ....RETRACT/OFF

Verify LIGHTS MAIN LANDING sws at OFF and RETRACT.
Observe EXTENDED lt off.

Windshield de-ice ....OFF

Verify W/SHIELD DE-ICE sels L and R at OFF.

Visor de-ice ....OFF

Verify VISOR DE-ICE sws L and R at OFF.

DV de-mist ....OFF

Verify DV DE-MIST sws L and R at OFF.

Taxi-lights ....RETRACT/OFF

Verify LIGHTS LANDING TAXI sws at OFF and RETRACT. Observe EXTENDED lt off. Verify LIGHTS TAXI TURN sws L and R at OFF.

MW lights ....TEST

Press and hold the CANCEL LTS TEST pb.
Observe all master warning lts on. Release the CANCEL LTS TEST pb
Observe all master warning lts off.

Press the INHIBIT pb.
Observe the INHIBIT lts (amber) on.
Press and hold the CANCEL LTS TEST pb and observe the master warning lts ADS, TRIM, PFC, ENG1, ENG2, ENG3 and ENG4 (red) on.

NOTE
This test confirms the inhibit facility.

Release the CANCEL LTS TEST pb.
Observe all master warning lts off.
Press and release the RECALL pb.
Observe the master warning lts indicate correct system status and the INHIBIT lts off.
Press and release the CANCEL LTS TEST pb.
Observe all master warning lts on and then off.

Lighting panel (right) ....AS REQUIRED

Set RH DASH INSTRUMENTS and RH DASH FLOOD rty sels to required settings.
Observe lighting as selected.
Press CHART LIGHT pb and set rty sel as required.
Observe light as selected.
Set RADAR ALERT sw to ON.
Select and hold D/B LIGHT sel at TEST.
Observe on right hand dash panels, all lights on.

Release D/B LIGHT sel to HI or set to LO as required.
Observe lts return to system status.
Set STOWAGE FLOOD sw as required.
Observe lts as selected.
Set SIDE CONSOLE rty sel to required setting.
Observe lighting as selected.
Set DIGITS rty sel to required setting.
Observe lighting as selected.

Oxygen (mask) ....TEST

On the associated audio selector panel set RT/INT sw to INT.
Press INT pb lt.
Observe INT pb lt (white) on.
Rotate BOOM/MASK rty sel to MASK and don headset.
Observe, on mask stowage panel, blinker indicator shows black.
Push down and hold RESET/TEST slide control at TEST.
Observe blinker indicator shows yellow cross, then shows black.
With RESET/TEST control slide still held at TEST, squeeze the red levers.
Observe blinker indicator shows yellow cross, then shows black.
With RESET/TEST slide controls still held at TEST, verify N/100% sw at 100%.
Press, momentarily, TEST pb.
Observe the sound of oxygen flowing over the mask microphone. Release RESET/TEST slide control and verify white area not visible
Observe blinker indicator shows black.
On the associated audio selector panel, rotate BOOM/MASK rty sel to BOOM. Remove headset.

RAD/INS switch ....RAD

Set the RAD/INS sw to RAD

VHF/NAV controller .... CHECK/SET

Set first officer's HSI course pointer to the lubber line.
On first officer's VHF/NAV controller:
Set local ILS frequency,
Set and hold TEST sel at VOR-UP/L
Observe on first officer's ADI: LOC and G/S flags appear, Localiser and Glide indexes out of view.
Observe on first officer's HSI: LOC, G/S and Navigation flags appear, beam bar and Glide indexes unchanged.

After approx. 6 seconds:

LOC, G/S and Navigation flags disappear, Loc index moves to left stop on ADI and beam bar moves approx. one dot left on HSI; Glide indexes one dot up; ANG appears on HSI.

After approx. 12 seconds:

LOC, G/S and Navigation flags reappear. On ADI, Loc and Glide indexes out of view.
Release TEST sel.
Observe on first officer's ADI and HSI, if aircraft is in range of ground station:
LOC, G/S and Navigation flags disappear.
Loc and Glide indexes appear.
Beam bar at original position and ANG appears on HSI.

Repeat actions with TEST sel held at DME-DN/R and check localiser and glideslope indications.
Set first officer's HSI course pointer to zero degrees.
Set a local VOR frequency.
Observe on first officer's ADI: LOC and G/S flags and indexes out of view.
Observe on first officer's HSI: G/S flag and index out of view.
Observe on VOR-RMIs: correct VOR 2 indication.
Set and hold TEST sel at VOR-UP/L.
Observe on first officer's HSI:
Beam bar central, Navigation flag in view.

After approx. 6 seconds:

Navigation flag disappears and ANG appears, FROM pointer appears and beam bar centres.

After approx. 12 seconds:

FROM pointer disappears and Navigation flag reappears.
Observe on VOR-RMIs, upon selecting VOR-UP/L:
VOR 2 pointers move to S on compass cards and
VOR 2 flags appear.
After approx. 6 seconds: VOR 2 flags disappear.
After approx. 12 seconds: VOR 2 flags reappear.
Release TEST sel.
Observe all indications return to original condition.

Set DME sel to DME.
Check, on DME indicators, that correct DME 2 information is displayed.
Set and hold TEST sel at DME-DN/R.
Observe, for the first second, DME 2 indicators blank.
For 2nd second, four dashes.
For 3rd second, 000.0 (+0.1 - 0).
Release TEST sel and check DME 2 indications return to original condition.

AUTOLAND light .... OFF

(Completely Revised)

Observe AUTOLAND lt off.

STEERING light ....ON

Observe STEERING lt on.

Ground proximity warning ....TESTED

With the droop nose at 5 degrees or UP
Press and hold the TERRAIN lt.
Observe TERRAIN lts (red) (2) flashing and audio warning "glide slope" followed by "whoop whoop pull up" repeated.
Release the TERRAIN lt
Observe audio warnings cease and TERRAIN lts (2) off.

M/CG light ....OFF

Observe M/CG lt off.

Warning and Landing display ....TEST

Press and hold TEST pb.
Observe AP light (red), AT light (red), ILS boundaries exceedence warnings (white). aircraft symbol (amber) and LAND 2 and LAND 3 lts (green) and DH lt (amber) on.
Observe, on captain's warning and landing display, AP light (red) AT light (red) ILS boundaries excedence warnings (white) and aircraft symbol (amber) on.
Observe brief audio warning (cavalry charge) and captain's and first officer's AUTOLAND lt (red) on.
Release TEST pb.
Observe all lts off.

IF ... AP light (red) on and/or AT light (red) flashing.
Press associated instinctive disconnect pb to cancel.
Observe AP and AT lts off.

NOTE
With the autopilots and autothrottles disengaged a true disengagement warning will be observed when the TEST pb is released.

R NAV ....OFF

Observe the R NAV, TK O/S and VOR FQY lts off.
Observe the DEV SENS MI reads LOW.

RADAR light ....OFF

Observe WX RDR lt off.

ASI ....CHECK/SET

Verify ASI mode sw at N.

Observe mode flag reads ADC and no failure flags visible on ASI.

ADI ....CHECK/TEST

Press and hold TEST pb.
Observe flag G visible, sphere moves 10 deg pitch up and 10 deg right bank on first officer's ADI and CHECK ATT lts (amber) on both ADIs.
Release TEST pb.
Observe sphere returns to initial attitude on first officer's ADI

Observe G flag not visible and CHECK ATT lts off on both ADIs.

VSI ....CHECK

Observe no failure flags visible on VSI.

Radio altimeter ....CHECK/TEST

Observe that red fail flag is out of view.

Rotate the DH setting knob to the detent (below zero feet) on the captain's and first officer's radio altimeter indicators.
Observe radio altimeter pointer indicates between minus 5 ft and minus 12 ft.
Observe on both ADIs, runway symbol is indicating aircraft height and red ALT flag is out of view.
Observe DH lts off on both ADIs and the warning and landing display.
Press and hold TEST pb.
Observe pointer indicates 100 ft and red fail flag in view.
On captain's ADI, observe runway symbol out of view and ALT flag in view.
Release TEST pb.
Observe red fail flag disappears, pointer rotates past 2500 ft behind the mask, then returns to below zero.
Observe, on captain's ADI: the runway symbol appears and the ALT flag disappears.
Observe a continuous 800 Hz audio warning sounds and the DH lts remain off.
Rotate DH setting knob to set bug to 20 feet.
Observe the audio warning ceases and the DH lts illuminate on both ADIs and the warning and landing display.
Press the DH setting knob and observe all DH lts off.

Instrument transfer switches ....SET

Verify first officer's ATT sw set at ATT/INS 2, COMP 1/COMP 2 sw at COMP 2, DEV1/DEV2 sw at DEV 2 and NAV sw at INS 2.

NOTE
The normal position of the first officer's instrument transfer switches is to the right.

(Unchanged)

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FIRST OFFICER'S COCKPIT PREPARATION ⑮ ⑯

achmeter ....CHECK

Observe no failure flags visible on machmeter.

HSI ....CHECK/SET

Pull No.2 HDG/TRK rty sel to the HDG position
Rotate No.2 HDG/TRK rty sel to the left or right.
Observe the corresponding heading is displayed on the AFCS panel and on the first officer's HSI; the heading index indicates the heading selected and HDG is displayed.
Verify MAG, RAD and 2 visible
Press and hold TEST pb.
Observe HDG alarm flag visible, compass rotates, 8888 visible in MILES and GND SPD displays and HDG lt (amber) on in captain's and first officer's HSIs.
Release TEST pb.
Observe HDG flag disappears, compass indicates a correct heading, 0000 visible in GND SPD displays and HDG lt off on both HSIs.

FD1/FD2 switch..FD2

Set first officer's FD1/FD2 sw to FD2.
Observe FD2 visible on first officer's ADI

Altimeter ....CHECK/SET

Verify mode sw at N.
Observe mode flag reads ADC and no failure flags visible on altimeter.
Rotate static pressure knob to set the airfield QNH in the corresponding windows and check altmeter reads within plus or minus 35 feet of the airfield elevation.
Set bugs to airfield elevation and 3 eng. acceleration height.

Clock ....SET

To adjust the GMT display,
- set the Timer/Chro switch to CHRO
- set the GMT sel. to FAST or SLOW as required.
When the correct time is established,
- set the GMT sel. to RUN.

To set a countdown time in the Chrono display,
- set the Timer/Chro switch to TIMER
- set the GMT sel. to FAST or SLOW as required.
When the countdown time in mins & secs is established,
- set the GMT sel. to RUN.

....CHECK

Observe sensible readings

VOR/RMI ....CHECK

Observe no flags visible on VOR/RMI if a VOR station in range.

de slip ....CHECK

Observe no failure flags visible on SIDE SLIP indicator.

ADF/RMI ....CHECK

Observe no heading failure flag visible on ADF/RMI.

Temperature ....CHECK

FIRST OFFICER'S COCKPIT PREPARATION ⑰

Observe no failure flags visible on temperature indicator.

Nose and visor control and indication ....CHECK

Observe VISOR/NOSE indication matches lever position.

Wiper override ....CHECK

Verify WIPER O/RIDE sw at NORMAL.

WHEEL O/HEAT light ....CHECK

Observe the WHEEL O/HEAT light is OFF providing the wheel brake temperature is less than 200 degrees C.

Incidence and Accelerometer ....CHECK

Observe no failure flags visible on the incidence indicator.

Landing gear lever and lights ....DOWN/CHECK

Confirm L/GEAR lever at DOWN.
Observe LH SHORT, UPPER LOCKS and RH SHORT lts off,
L/GEAR transit lts off and LH, NOSE, T and RH
arrow lts (green) on.

Flight control indicators ....CHECK

If ...elevons or rudders not aligned.
Delay this step until after the engineer's external inspection and request he observes and notes control surface positions.

NOTE

During a turnaround,because the outer elevons are lighter than the others, they may not droop at the same rate. The rudders may also be misaligned because the surfaces are independant and can be affected by wind gusts.

Observe the flight control channel MIs (8) read M.

Observe flight control position indicator warning lts (8) off.

IF ...any warning lts on
Press the RESET pb and observe all warning lts off.

Press and hold the ALARM TEST pb.
Observe warning lts (8) (red) flash.
Release the ALARM TEST pb.
Observe warning lt (8) on, MWS PFC lt (red) on and audio (gong).
Press ALARM RESET pb.
Observe warning lts (8) off, MWS PFC lt off and INNER ELEV lt (red) on.

NOTE

On ground with no hydraulic pressure available, the elevons droop and unload their corresponding servo controls which causes the INNER ELEV light to come on.

NOSE WHEEL lt ....ON

Observe NOSE WHEEL lt (amber) on.

Anti-skid ....CHECK

Hold, then release, anti-skid system test sel at TEST 1.
Observe anti-skid R lts (8) (white) on, then off.
Repeat the test with test sel at TEST 2 position.

Brake pressures and warning lights ....CHECK

Verify brake control lever at NORM, then depress brake pedals.
Observe dual BRAKES pressure gauge reads 0, BRAKES EMERG lt off and BRAKES FAIL lt (red) on.

Release brake pedals, set brake control lever to PARK.
Observe dual BRAKES pressure gauge reads full scale on both sides, no failure flag visible, BRAKES FAIL lt off and BRAKES EMERG lt (amber) on.

Take-off monitor ....DISARM

Pull T/O MONITOR control button.

AFCS lights ....AS REQUIRED

Set AFCS MODES lighting rty sel as required.

Total fuel contents indicator ....CHECK

Observe no failure flag showing on TOTAL CONTENTS indicator and sensible readings indicated.

(Unchanged)

Primary engine indication .... CHECK

Observe power management lts (12) off
Observe N2 pointers (4) and digital counters (4) at 0, overlimit pointers 110% and no flag across digital counters (4).
Observe N1 pointers (4) and digital counters (4) at 0, overlimit pointers at 108.5%, N1 auto reduction lts (4) off and no flags across digital counters (4).
Observe FUEL pointers (4) and lower digital counters (4) at 0, instrument mode flags read F/E, top digital displays and bug settings agree and no flags across lower digital counters (4).
Observe EGT pointers (4) and digital counters (4) show sensible readings, no flags across digital counters (4) and EGT instrument warning lt off.

NOTE

The EGT failure flags may be visible if the outside temperature is below minus 5 deg C.

Observe AREA instrument pointers (4) show sensible readings and no flags and reheat selected lts (4) off.

INS 2 ....PRESENT POSITION CHECKED

Position INS 2 data selector to POS. Record displayed present position on first officer's flight log. Cross check recorded position with listed ramp position in the Aerodrome Folder.

Autopilot ....CHECK

Verify AUTOPILOT TURN knob in detent.

Selcal .... TEST

Set SELCAL 1 and SELCAL 2 mode sels as required.

Press to test the SELCAL 1 pb lt and adjust lighting as required.
Observe SELCAL 1 pb lt (amber) on when pressed.
Release SELCAL 1 pb lt.
Observe pb lt off.
Press to test SELCAL 2 pb lt, adjust lighting as required.
Observe SELCAL 2 pb lt (amber) on when pressed.
Release SELCAL 2 pb lt.
Observe pb lt off.

Cabin altimeter (Post Mod) .... CHECK

Observe sensible reading

Audio Selector Panels .... SET

Trim wheels ....SET

Verify YAW, PITCH and ROLL trims at neutral.

Throttles .... CHECK

Advance throttle levers (4) to fully forward and return to the idle stop.
Observe no undue force is required.

Baulk override ....CHECK

Verify BAULK O/RIDE handle aligned with the longitudinal axis of the aircraft and fully down.

Windshield wipers .... CHECK

Verify W/S WIPERS rty sels (2) at OFF.

Observe wipers are parked.

CAUTION
W/S wipers must not be operated on a dry screen but may be ground tested on a wet screen.

NOSE and VISOR STBY control ....OFF/GUARDED

Confirm NOSE and VISOR STBY control is OFF and guarded.

Reheat .... OFF

Verify REHEAT sels (4) at OFF.

Throttle lights .... TEST

Press to test No. 1 engine THROT lt.
Observe THROT lt (red) on, MWS THROT lt (red) on, audio (gong) and No. 1 engine THROTTLE MASTER sw lt (red) on.

Repeat action for No. 2, 3 and 4 engine THROT lts.

VHF Com .... AS REQUIRED

Set VHF 1 frequencies as required.

Verify TFR sw at desired position.
Observe corresponding lt (green) on.

Repeat these actions for VHF 2.

Radar .... SET

CAUTION
The radar must not be selected on while the aircraft is being refuelled. It must not be operated, except in STBY or TEST mode, when any refuelling operation is taking place within 100 yards of the antenna.

Verify SYSTEM rty sel at 1
Press the STBY pb lt and observe STBY lt (white) on.
Verify TILT sel at 5 deg UP.
Rotate GAIN control to AUTO.
Rotate RANGE rty sel to 100
Rotate RANGE MARKS control as required
Move the polaroid filter to the left stop
Set the IND OFF/LEFT/AHEAD/RIGHT rty sel to AHEAD.

If a radar test is required

Set SYSTEM rty sel to 2.
Rotate INT knob fully counter-clockwise.
Press TEST pb on radar controller and observe TEST lt (white) on and STBY lt off.

Rotate INT knob clockwise until correct TEST pattern appears.

NOTE

A 3-minute warm-up period should be allowed before checking radar display.
Due to the integrating properties of this type of indicator, it is important to appreciate that the effect of adjusting the intensity (brilliance) will be fully apparent only after approximately four to five azimuth sweeps.
The assessment of any adjustment should be made only after this condition has been met.
Under normal conditions a satisfactory display will be obtained with the INT control set between the 10 o'clock and 2 o'clock positions.
Too high a setting of the INT control will result in "blooming" and severe loss of definition.

Set SYSTEM rty sel to 1.
Press the STBY pb lt
Observe STBY lt (white) on and TEST lt off.

Transponder ....CHECK/STBY

Verify ALT RPTG sw at 1.
Verify ATC sw set at 1.

If transponder test required.

Set ATC mode rty sel to A.
Press and hold ATC TEST pb.
Observe REPLY lt (green) on for 15 seconds.
Release ATC TEST pb.
Set ATC mode rty sel to STBY.

ADF .... TEST

Select the required ADF frequencies for ADF1 and ADF 2 on the ADF control unit.
Observe sensible position of the ADF pointers on both ADF/RMI.

Set BFO sw to 1 or 2 as appropriate.
Press and hold ADF 1 TEST pb.
Observe ADF 1 pointers indicate 135 deg relative on both ADF/RMI and audio warning (1020 Hz).
Release ADF 1 TEST pb.
Observe ADF 1 pointers return to initial positions on both ADF/RMI.
Press and hold ADF 2 TEST pb.
Observe ADF 2 pointers indicate 135 deg relative on both ADF/RMI.
Release ADF 2 TEST pb.
Observe ADF 2 pointers return to initial positions on both ADF/RMI.

HF .... AS REQUIRED

Verify HF 1 and HF 2 sels as required.
Set frequencies as required.

Air data computer No. 2 ....CHECK

Set ADC TEST rty sel to COMP.
Observe MWS ADS lt (red) on, audio (gong), TEST lt (blue) on almost instantaneously after COMP selected and flags on airspeed indicators.
Set ADC rty sel to NORM.
Observe MWS ADS lt off, TEST lt off and no flags on airspeed indicator.

Landing gear horn ....TEST

Press the GRND TEST L/G HORN pb.
Observe landing gear audio (horn).

Lights panel .... TEST

Set and hold LIGHTS sel to TEST.
Observe all warning lights on the centre dash panel are on.

Release LIGHTS sel to HI or set to LO as required.
Observe lts return to system status.

BEFORE START CHECK

Master c/bs ....CHECK/SET ALL

E will - confirm that the master CBs, as identified by the white surrounds are set.

- check no flags on the engine primary and secondary instruments.

C will - confirm that failure flags are not in view on his flight instruments.

P will - confirm that failure flags are not in view on his flight instruments.

Cockpit preparation ....COMPLETED ALL

Confirm the cockpit preparation is completed by scan.

Oxygen ....CHECKED/100% ALL

Confirm oxygen masks checked and
N-100% sw at 100%

DV Windows..CLOSE C.P

Verify the sliding side windows are closed and secure.

Flight control inverters ....ON P

Confirm BLUE INVERTER and GREEN INVERTER sels at ON.

ANTI-STALL SYSTEMS ....ON P

Confirm ANTI STALL SYSTEM sws at ON

RAD/INS SWS ....RAD C.P

Confirm both RAD/INS sws to RAD
Observe on both HSI that RAD and MAG displayed.

Instrument transfer sws ....SET C.P

Confirm the Captain's instrument transfer switches to the left and First Officer's instrument transfer switches to the right.

Altimeters ....CHECKED/SET ALL

Confirm both main altimeters set to QNH & mode sws at "N"
Check bugs set to airfield elevation and three engine acceleration height.
Set Radio Altimeter bugs to 20' & check DH lts on.

NAV/radios .... TUNED/SET ALL

The ADF and VOR should be tuned and checked on the facilities. Required QDM set on VOR LOC selectors and heading or track set on the HDG/TRK selector if required.

Brakes ....PARK/CHECKED P.E

Confirm brakes are full scale and brake control lever at PARK.

BEFORE START CHECK

Throttles ....IDLE E

Confirm throttles at idle.

Nav. Lights ....AS REQD E

Select Navigation lights ON or OFF as required.

THROTTLE MASTER ....ON E

Confirm THROTTLE MASTER sels are at MAIN or ALTERN.

GROUND HYD CHECK OUT ....YELLOW YELLOW/OFF E

Verify the GROUND HYD CHECKOUT rty sel at YELLOW YELLOW
Verify PUMP 1 G-Y and PUMP 2 B-Y sws at OFF.

FUEL HEATERS ....AUTO E

Confirm Fuel Heater selectors at AUTO

ENGINE RECIRCULATION VALVES ....SHUT E

Confirm ENGINE RECIRCULATION VALVES sws at SHUT

SECONDARY AIR DOORS ....AUTO E

Set the SECONDARY AIR DOORS sels to AUTO.

Batteries ....ON E

Set battery sels to BATT ON.
Observe: BATT A and BATT B MIs show inline, BATT ISOLATE lts off and LH and RH ESS/MAIN SPLIT MIs show inline.

NOTE: BATT ON is selected to prevent any interruption of the d.c. supply during engine start.

INS 1, 2 and 3 ....LOADING CHECKED NAV MODE/MIX ALL

C.P.E. select POS on the data selector of INS 1, 2 and 3 respectively. C. reads the ramp position from the Aerodrome Folder. C.P.E. verify that this position is displayed on their respective INS and circle the present position written on their flight logs.

C.P.E. select data selector to WAY PT and waypoint/DME selector to 1.
C. reads from his own flight log the number and name of the first waypoint. P.E. number and check this waypoint on their own flight logs.
C. reads thelatitude and longitude of that waypoint.
C.P.E. verify that displays agree with this position and circle the waypoint number on their flight logs.
This procedure is carried out for a minimum of the first three waypoints.

(Unchanged)

Set data selector to DSRTK/STS
Verify Alignment number is 5 or less
On INS 1, 2 and 3 MSU rotate the mode rty sel to NAV and check mode status 1

Press key 4.
Observe 000004 appears in right data display.
Press INSERT switch
Observe INSERT switch extinguishes and data displays return to normal with 4 appearing in the last digit of right display.
Check INS ground speed within limits
Confirm INS AUTO/MAN Sw. at AUTO
Observe INS 1, INS 2 and INS 3 monitor lts off

ASI bugs and pitch index .... SET ALL

Set the ASI bugs and pitch index.

Clock, Engine and TLA bugs .... SET ALL

Preset noise abatement time.
Set the engine bugs and throttle angle indices.

Briefing .... STATED C

Confirm briefing completed and understood.

Loadsheet .... CHECKED ALL

C will check and sign the loadsheet
P will extract the take-off weight to complete the take-off data sheet
E will extract the ZFW, ZFCG, PTOTR or PTOBO and final tank 11 fuel.

ZFW and ZFCG .... SET/CHECKED EC

E will - set the loadsheet ZFW and ZFCG in the ZFW and ZFCG displays
- call the ZFW and ZFCG settings.

C will - confirm that the ZFW and ZFCG settings agree with the loadsheet values.

TOTAL FUEL REM/A/C WEIGHT .... SET/CHECKED ALL

E will - set the loadsheet ZFW in the A/C Weight display
- zero the Fuel Remaining display by setting the RH knob to any position other than N and momentarily pulling the LH knob.
- extract the Total Fuel Required from the refuel sheet and set this figure in the Fuel Remaining display.

- set the RH knob to N to enable the A/C Weight and Fuel Remaining displays to count down.
- check that the A/C Weight display agrees with the loadsheet take-off weight plus taxy fuel.
- call the Fuel Remaining and A/C Weight indications.

C will - cross check the fuel figure against the Total Contents indicator and the loadsheet.
- cross check the weight against the loadsheet.

P will - cross check the fuel figure against the Total Contents indicator and the fuel flight plan.
- cross check the weight against the take-off data sheet.

Load Limits..........SET E

Set tank 11 load limit control to the FINAL TANK 11 CONTENTS from the Load Sheet.

ASI bugs and pitch index..........UPDATE ALL

Update the ASI bugs and pitch index as required.

Clock Engine and TLA bugs..........UPDATE ALL

Update the noise abatement time, the engine bugs and throttle angle as required.

Start clearance..........OBTAIN P

Obtain start clearance from ATC.

Door lights..........CHECKED E

Observe all DOORS lts are off with the exception of MISC HATCHES lt

Master warning..........RECALL C

Press the RECALL pb.
Observe the master warning lights indicate the accepted systems status.

Anti collision lights..........ON E

Set the Anti Collision lights sw to ON.

ENGINE FEED PUMPS..........ON E

Set engines 2 and 3 main ENGINE FEED PUMPS sws to ON
Observe the pumps LOW PRESS lts off
Observe the engine inlet LOW PRESS lts off.

NOTE: In the event of the ground electrical supply being suspect only switch on the main ENGINE FEED PUMP of the engine to be started first. The remaining pumps are then switched on after starting the first engine.

Clearance to Start..........OBTAIN EG

Press GRND CALL pb, contact ground crew on interphone and request clearance to start.
The Ground Engineer will check that, chocks are in position, fire equipment immediately available, engines clear, gear locks and covers removed, beacon on and all doors closed. He will respond with, "Clear to Start".

If an engine start is made with a door open, its closure must be confirmed before releasing the aircraft.

(Unchanged)

BEFORE START CHECK

Start Engines ....AS REQUIRED E

CAUTION: IF DURING ENGINE START A RED VIBRATION WARNING OCCURS, SHUT THE HP VALVE IMMEDIATELY AND VERIFY THE START/RELIGHT SELECTOR AT OFF.

Set DEBOW sws (4) to DEBOW.
Observe DEBOW sw lts (yellow) (4) on.

Normal starting order is 3,4, 2, 1.
For push back departures starting order is 3 and 2 on the ramp, then 4 and 1 (cross bleed) when away from the ramp.

ON ENGINE NO.3

Set START/RELIGHT sel to START.
Observe START/RELIGHT sel is latched at START. START VALVE MI reads OPEN. ENGINE DEBOW sw lt off, START PUMP lt (yellow) on, N2 rises.

The minimum recommended air pressure during starting is 29 psi for ambient temperatures above 0 deg C increasing to 32 psi at an ambient temperature of minus 40 deg C.

IF ...START VALVE MI is not reading OPEN inform ground staff to turn off ground air supply, manually open the start valve then turn ground air supply on.

When N2 is between 10-12% set HP VALVE sw to OPEN.
Observe RH IGN or LH IGN lt (green) on, engine shut down handles lts (red) on, THROT lt off and T1 ENGINE PROBE HEATER lt off.

NOTES: With the HP VALVE switch at OPEN the inhibition of the engine shut down handle lights is removed and they are on as part of the engine oil low pressure warning.

During starting, the engine oil low pressure warning light may remain illuminated at the debow speed. The start may be continued provided that some oil pressure is indicated. The low pressure warning must be off when the engine stabilizes at Idle.

IF ...THROT lt (red) comes on immediately HP VALVE is set to open. Set HP VALVE sw to SHUT, START/RELIGHT sel to off, ENGINE DEBOW sw to NORMAL.
Verify THROTTLE MASTER sel at MAIN or ALTERN.
Restart engine.

The THROT lt coming on immediately the HP VALVE sw is set to OPEN indicates there is no throttle lane selected.

Observe EGT increases and monitor the rate of increase.

NOTE: an increase in EGT is an indication of engine light up and should occur within 8 seconds of opening up the HP VALVE; the maximum EGT will not normally exceed 450 deg C.

IF ...no increase in EGT within 8 seconds.
Set HP VALVE sw to SHUT, set START/RELIGHT sel to OFF and set ENGINE DEBOW sw to NORMAL
apply procedure FALSE START.

IF ...EGT rate of rise shows 550 deg C may be exceeded or T1 ENGINE PROBE HEATER lt (yellow) on.
Set HP VALVE sw to SHUT, set START/RELIGHT sel to OFF and set ENGINE DEBOW sw to NORMAL.

IF ...THROT lt (red) comes on after light up but before ENGINE DEBOW sw is set to NORMAL set THROTTLE MASTER sel to opposite selection and continue with engine start.

When N2 is at 25%.

Observe START/RELIGHT sel returns to OFF.

IF ...START/RELIGHT sel remains at START.
Set START/RELIGHT sel to OFF.

Observe the START VALVE MI reads SHUT, the RH IGN and LH IGN lts off.

IF ...START VALVE MI reads OPEN

Inform ground staff to turn off ground air supply and manually close the start valve.

IF ...Ground staff report START VALVE will not shut set HP VALVE sw to SHUT.

DEBOW START

If more than 10 minutes or less than five hours has elapsed since the engine was last operated then it must be run in the debow conditions for at least one minute.

Start clock.
Observe N2 stabilised at approximately 30%

Wait until the ENGINE DEBOW sw lt (yellow) comes on or 1 minute has elapsed since START/RELIGHT sel returned to OFF.

NOTES: The engine speed should stabilise at approximately 30% N2. It is likely, particularly at high altitude airfields, that the engine speed will overshoot the stabilised debow speed. In extreme circumstances this overshoot could be up to 10% of N2.

It is permissible to run the engine in the debow condition for up to 3 minutes provided that icing conditions do not exist. Icing conditions for debow are when the ambient temperature is below 3 deg C and visibility is less than 1,000 metres when debow must be limited to 1 minute.

IF ...Stabilised N2 exceeds 32% or N2 exceeds 32% for more than 5 seconds during overshoot set HP VALVE sw to SHUT, set THROTTLE MASTER sel to opposite selection and restart the engine.

Set DEBOW sw to NORMAL

Observe N2 rises then returns to idle, ENGINE DEBOW sw lt off.

NOTE: THE START PUMP will run for approximately 30 secs after the ENGINE DEBOW sw is set to NORMAL.

IF ...N2 does not rise to clear rotating stall or fails to achieve idle, set THROTTLE MASTER sel to opposite selection when N2 stabilised at idle advance throttle lever slowly to obtain 72% N2, return throttle to idle.

CAUTION: IF THE THROTTLE LEVER IS ADVANCED TOO QUICKLY DURING ROTATING STALL CLEARANCE ENGINE SURGE MAY OCCUR.

Observe AREA fully open.

NOTE: The primary nozzle will normally be fully open during engine start cycle but occasionally it may tend to close during start but should be fully open by the time the engine has achieved idle.

IF ...AREA not fully open when idle achieved, set THROTTLE MASTER sel to opposite selection and observe AREA fully open.

Observe START PUMP lt off.

IF ...START PUMP lt (yellow) ON.
TRIP the start pump cb.

CAUTION: WITH AN INOPERATIVE START PUMP, AUTO AND MANUAL RELIGHTS, WILL NOT BE POSSIBLE.

BEFORE START CHECK

NOTES: It is permissible to leave the start pump running but an inspection of the HP and LP turbines must be made on landing. If during engine start an AMBER vibration warning occurs it may be ignored providing the level of vibration reduces to 2 1/2 ins/sec within 1 min after 25% N2 is achieved and the warning can be cancelled by reset switch action when engine achieves idle speed.

After start or during taxying, engine operation in the range 88% to 93% N1 must be of a transient nature in order to minimise LP compressor blade vibration. There must be no steady state running within this speed band and operation must be kept to the minimum possible.

After start or during taxying, engine 4 must not be oprated above 90% N2 for more than 30 seconds with Eng 4 T/O N1 limiter switch set at 88%. If it is necessary to carry out more than one operation above 90% N2 a cooling period of at least 5 minutes must elapse at idle between such operation.

Set the BLEED VALVE sw to OPEN.
Observe pressure gauge indicator approximately 20 psi.
Set COND VALVE sel to ON
Observe - MI in line within 30 secs
- mass flow satisfactory.

Set the green hydraulic system pump sels 1 and 2 and the blue hydraulic system pump sel 3 and 4 to ON.

Observe CSD lt off.

REPEAT ENGINE STARTING PROCEDURE FOR OTHER ENGINES.

Set appropriate main ENGINE FEED PUMPS to ON
Observe the pumps LOW PRESS lts OFF

(Text Unchanged) REPRINT

FUEL LP PROTECTION CHECK

When 1 and 4 engines are stabilised at idle
Switch engines 1 and 4 Feed Pumps OFF
Observe - pumps Low Pressure lts on
- 1 and 4 Acc lts on
- 1 and 4 Bypass Valve MIs read OPEN.

Switch engines 1 and 4 main Feed Pumps ON
Observe - pumps Low Pressure lts off
- 1 and 4 Acc lts off
- 1 and 4 Bypass Valve MIs show black.

Set ignition rty sel to OFF.

Scan the engine instruments
Observe that for all engine parameters the indications are consistent over the four engines.

The allowable scatter is

N2	TBD	
N1	TBD	
ENG FUEL	TBD	
EGT	TBD	awaiting RR data
AREA	FULLY OPEN	
P7	TBD	

Observe SECONDARY NOZZLE instruments indicate 18-24 deg.

NOTE: For take-off, the buckets should be at 21 deg. However, take-off is permitted with buckets within the range 18-24 deg.

CAUTION

IF, AFTER STARTING ENGINES OR WHEN TAXYING, AN ENGINE RUNS DOWN,
- SET HP VALVE SHUT
- THROTTLE MASTER TO THE OTHER LANE
- RESTART ENGINE

NORMAL PROCEDURES
PUSHBACK CHECK

Start engines .... 3 and 2   E

Start engines 3 and 2 using the normal start procedure.

BRAKE FANS .... ON   E

Verify BRAKE FANS sw at ON

Hydraulics .... CHECKED   E

Observe green, yellow and blue system contents gauges pointers indicate within green band.

NOTE: After engine start there is a slight drop in level in each reservoir which is caused by the filling of the accumulators.

Observe pumps L/PRESS lts (6) off.

Observe green, yellow and blue system pressure gauges read normal.

Crossbleed Valves 2 and 3 .... OPEN   E

Verify engines 2 and 3 BLEED VALVE sws at OPEN
Set engines 2 and 3 CROSS BLEED VALVES sws to OPEN

Ground equipment .... CLEAR   P.G

Request ground engineer to verify, disconnection of pre-conditioned air truck and access door closed, disconnection of electrical ground truck and access door closed, disconnection of air start truck and start connector blanking cap fitted and access door closed.

PUSHBACK

CAUTION: DURING THE WHOLE PUSHBACK OPERATION THE GROUND INTERPHONE MUST BE OPERATIVE.

Nos 4 and 1 Engines .... START   E

Start 4 and 1 using Cross bleed start procedure.
Satisfactory bleed pressure (25-30 psi) is normally obtained with engine at high idle.

PUSHBACK CHECKLIST .... COMPLETED   E

NORMAL PROCEDURES
AFTER START CHECK

Nosewheel steering ....CHECKED P

Press the nosewheel RESET pb.
Observe NOSE WHEEL lt off and STEERING lts (2) off.

NOTE: If the nose wheels are not centred it may be necessary to push the RESET pb several times.

IF ...nose wheel inhibit system engaged.
Put off the following actions until the inhibit system is switched off.

NOTE: To tow the aircraft with engines running, or hydraulic pressure on, the nose wheel steering is de-activated by a control lever located in the ground engineer's interphone box.
When the system is inhibited, the NOSE WHEEL lt (red) and the two STEERING lts (red) come on.

Set and hold NOSE WHEEL test sel at TEST 1.
Observe NOSE WHEEL lt (red) and STEERING lts (red) on.
Release test sel.
Observe NOSE WHEEL lt and STEERING lts off.

Repeat these actions, using TEST 2.

Flight Control AFCS and TRIMS ....CHECKED C

Observe, on the flight control position indicator, elevons inline, rudders inline and flight control channel MIs read M.

Press to cancel MECH JAM lt (red).
Observe MECH JAM lt off.

NOTE: The MECH JAM light has remained locked on, even though the elevons have moved to an aligned position.

Trims

Hold the nose wheel steering handle and rotate the YAW TRIM knob to right yaw until it stops.
Observe rudder pedals move correctly, the yaw trim indicator is at 20 deg. and, on the flight control position indicator, both rudders at 20 deg. right.
Rotate YAW TRIM knob to neutral mark.
Observe rudders inline at 0 deg.
Repeat for left yaw and return to neutral.

Rotate the pitch trim wheel to nose up until it stops.

Observe control column moves rearwards, pitch trim indicator is at 15 deg. and on flying control position indicator the elevons at 15 deg. up.
Rotate pitch trim wheel to neutral mark.
Observe elevons inline at 0 deg.
Repeat for nose down trim 8 deg. and return to neutral.

Rotate ROLL TRIM knob to right roll trim until it stops.
Observe pilot control moves correctly, roll trim indicator is at 10 deg. and on the flight control position indicator,
Left middle and outer elevons at 10 deg. down.
Left inner elevon at 7 deg. down.
Right inner elevon at 7 deg. up.
Right middle and outer elevons at 10 deg. up.
Rotate ROLL TRIM knob to neutral mark.
Observe elevons inline.
Repeat for left roll trim and return to neutral.

Set ELECTRIC TRIM 2 sw to engage.
Observe sw remains engaged.

NOTE: The ELECTRIC TRIM No. 2 is engaged first because the subsequent engagement of ELECTRIC TRIM No. 1 will check the priority of system 1 over system 2.

Set ELECTRIC TRIM 1 sw to engage.
Observe sw remains engaged.

On captain's control wheel, set and hold PITCH TRIM sel at UP.
Observe control columns and mechanical trim wheel respond to the order, audio (bell) during operation and flight control indicator bars move accordingly.

Before the maximum limit is reached.
Hold and arrest the movement of the PITCH TRIM wheel.
Observe ELECTRIC TRIM sws drop to OFF, MWS TRIM lt (red) on and audio (gong).
Release PITCH TRIM sel.

NOTE: Maximum pitch up deflection is approximately 15 deg. At this value the electric trim may automatically disengage and activate warnings (MWS TRIM light (red) and audio (gong))

Set No. 2 ELECTRIC TRIM sw to engage
On captain's control wheel, set and hold PITCH TRIM sel at DOWN.
Observe control columns and mechanical trim wheel respond to the order, audio (bell) during operation and flight control indicator bars move accordingly.
Release PITCH TRIM sel when mechanical trim wheel is at neutral position.
Observe control columns and mechanical trim wheel stop.

Set No. 1 ELECTRIC TRIM sw to engage.

Flight Controls Mechanical Channel

With pitch control at neutral, apply full left wing down control.
Observe that control stiffness is normal and, on the flight control position indicator, the elevons sensibly follow the control movement to full roll deflection:

Left middle and outer elevons at	20 deg up
Left inner elevon at	14 deg up
Right inner elevon at	14 deg down
Right middle and outer elevons at	20 deg down

NOTES: Applying full left wing down control tests the mechanical channel in roll, the rate of operation of the PFC servos and relay jacks and the operation of the relay jacks selectors.

The artificial feel system will cause an increase in control stiffness with increasing deflection.

Return controls to neutral.
Observe elevons in line.
Repeat roll test for full right wing down control.

Push control column fully forward.
Observe that control stiffness is normal and, on the flight control position indicator, the elevons sensibly follow the control movement to full pitch deflection.
All elevons 17 deg. down.
Return control column to neutral.
Observe elevons inline.
Repeat pitch test for control column full rearward and all elevons 15 deg. up.

NOTE: The 15 deg. up stop can be overriden to obtain 17 deg. by applying additional pressure.

Hold nose wheel steering handle and push rudder pedals to full left.
Observe that control stiffness is normal, and, on the flight control position indicator, the rudders sensibly follow the control movement to full deflection, both rudders 30 deg. left.

NOTE: The nose wheel will follow the rudder movement, thus scrubbing the tyres, unless the steering handle is firmly held.

Return rudder pedals to neutral.
Observe rudders at neutral
Repeat the rudders test for rudder pedals to full right and both rudders 30 deg. right.

ompletely Revised)

Flight Controls Electrical Channels and AFCS

Set the O & M ELEVONS sel, the IN ELEVONS sel and RUDDER sel to GREEN.
Press the RESET pb of O & M ELEVONS, IN ELEVONS and RUDDER.
Observe, on the flight control position indicator the flight control channel MIs (8) read G.

Set AUTO STAB No. 1 PITCH and ROLL sws to OFF.

Observe ANTI STALL SYST 1 FAIL lt (amber) on.

NOTE: With No. 1 Autostabilization disengaged the priority is overridden thus allowing a test of No. 2 Emergency Control.

With hands off controls.
Press and hold the emergency control test pb.
Observe EMERG CONT pb lt (green) on.

NOTE: Ensure there is no input control on the control wheel or control column which could upset the test.

Observe on flight control indicator all elevons inline and movement is not more than one degree up or down.

NOTE: Excessive movement of the elevons indicates an erratic signal from the emergency control sensing unit.

Release the emergency control test pb.
Observe EMERG CONT pb lt off.

Re-engage AUTO STAB No. 1 PITCH and ROLL sws.
Observe ANTI STALL SYST 1 FAIL lt off.

Press and hold the emergency control test pb.
Observe EMERG CONT pb lt (green) on.
Observe on flight control indicator all elevons inline and movement is not more than one degree up or down.
Release the emergency control test pb.
Observe EMERG CONT pb lt off.

Verify the AUTOPILOT TURN knob is centred
Set No. 1 AP sw to engage
Observe sw remains engaged AP.1 lt (green), PITCH HOLD pb lt (white) and HDG HOLD pb lt (white) on.

Press and hold the emergency control test pb
Observe the EMERG CONT pb lt (green) on.

(Complete revised)

Apply light nose up and nose down pressures on the control column.
Observe, on the flight control position indicator, response from all elevons.

NOTE: This confirms that the elevons are in green electrical channel.
If undue force is applied the autopilot will disconnect.

Set AP 2 sw to engage

Observe sw remains engaged, AP 2 lt (green) on, AP 1 sw drops to OFF and AP1 lt off.

Press the pilot's autopilot instinctive disconnect pb.
Observe AP 2 sw drops to OFF, AP 2 light off, AP light (red) on at both landing display indicators and audio (cavalry charge).

Press again the pilot's autopilot instinctive disconnect pb.
Observe AP light off at both landing display indicators.

Apply full left wing down control, then full right wing down control and return to neutral.
Observe that control stiffness is normal and the elevons sensibly follow the control movement to full deflection while the rudders deflect 8 deg. Then all surfaces return to neutral.

NOTE: Applying full left wing down and right wing down control tests the green electrical channel in roll and since autostabilization is engaged the roll/yaw turn co-ordination function appears as an 8 degree rudder deflection, thus confirming that both rudder PFC servos are in green electrical mode.

Push control column fully forward, then pull fully rearward and return to neutral.
Observe that control stiffness is normal and the elevons sensibly follow the control movement to full deflection then return to neutral.

Hold nose wheel steering handle and push the rudder pedals to full left, then to full right and return to neutral.
Observe that control stiffness is normal and the rudders sensibly follow the control movement to full deflection and return to neutral.

(Completely Revised)

Set the O & M ELEVONS sel, the IN ELEVONS sel and RUDDER sel to BLUE.
Press the RESET pb of O & M ELEVONS, IN ELEVONS and RUDDER.
Observe on the flight control position indicator the flight control channel MIs (8) read B.

Set No. 1 AP sw to engage
Observe sw remains engaged AP 1 lt (green), PITCH HOLD pb lt (white) and HDG HOLD pb lt (white) on.

Press and hold the emergency control test pb
Observe the EMERG CONT pb lt (green) on

Apply light nose up and nose down pressures on the control column. Observe, on the flight control position indicator, response from all elevons.

NOTE: This confirms that the elevons are in blue electrical channel.

Press the pilot's autopilot instinctive disconnect pb.
Observe AP 1 sw drops to OFF, AP 1 light OFF, AP light (red) on at both landing display indicators and audio (cavalry charge).

Press again the pilot's autopilot instinctive disconnect pb.
Observe AP light off at both landing display indicators.

Rotate the SERVO CONTROLS yellow rty sel to YELLOW GREEN
Press the RESET pbs and observe on the flight control position indicator the flight control channel MIs (8) read B.
Push the control column forward then pull rearward to give approximately half range movement on the control surfaces.
Return the control column to neutral.

Rotate the SERVO CONTROLS yellow rty sel to YELLOW BLUE
Press the RESET pbs and observe on the flight control position indicator the flight control channel MIs (8) read B.
Push the control column forward, then pull rearward to give approximately half range movement on the control surfaces.
Return the control column to neutral.

Rotate the SERVO CONTROLS yellow rty sel to NORMAL
Press the RESET pbs and observe on the flight control position indicator the flight control channel MIs (8) read B.

NOTE: This check of the PFC hydraulic shuttle valves is made to confirm their electrical and hydraulic response to changeover.

Rotate the SERVO CONTROLS black rty sel to GREEN ONLY
Observe the GREEN ONLY pea lts (2) (green) on, BLUE L. PRESS lt (red) on and flight control channel MIs (8) read G.

Rotate the SERVO CONTROLS black rty sel to BLUE ONLY
Observe the BLUE ONLY pea lts (2) (green) on, GREEN L. PRESS lt (red) on and flight control channel MIs (8) read M
Rotate the SERVO CONTROLS black rty sel to NORMAL
Observe GREEN L. PRESS lt off.
Press the RESET pbs and observe the flight control channel MIs (8) read B.

NOTE: This verifies the depressurisation capability of the PFC green and blue hydraulic systems.

Stab and Feel ....ENGAGED P

Set AUTO STAB No. 1 PITCH, ROLL and YAW sws to engage.
Set AUTO STAB No. 2 PITCH, ROLL and YAW sws to engage.
Observe sws remain engaged.

Set ARTIFICIAL FEEL No. 1 PITCH, ROLL and YAW sws to engage.
Set ARTIFICIAL FEEL No. 2 PITCH, ROLL and YAW sws to engage.
Observe sws remain engaged.

Engine anti-icing ....AS REQUIRED E

Engine anti-ice must be selected ON after engine start and left on for taxy and take-off whenever the ambient temperature is below +3°C and visibility less than 1000 metres

BRAKE FANS ....ON E

Verify BRAKE FANS sw at ON

GRD IDLE ....LO E

Confirm the ENG 1 and 4 and ENG 2 and 3 sws are at LO.
Observe idle N_2 reduces slightly

Door Lights .... TESTED/OFF E

Observe all DOORS lts are off.
Press and release the DOORS TEST pb.
Observe DOORS lts (red) on then off.

Engine Feed Pumps .... ALL ON E

Set all ENGINE FEED PUMPS sws to ON.

Observe - all ENGINE FEED PUMPS LOW PRESS lts off.
- all ENGINE INLET LOW PRESS lts off. E

Hydraulics .... CHECKED E

Observe green, yellow and blue system contents gauges pointers indicate within green band.

NOTE: After engine start there is a slight drop in level in each reservoir which is caused by the filling of the accumulators.

Observe pumps L/PRESS lts off.

Observe green, yellow and blue system pressure gauges read normal.

Electrics ....CHECKED: GROUND BYPASS E

Observe CSD OIL overheat lts off, CSD OIL DIFF and INLET temperatures are normal.

Observe each KW KVAR meter indicates a normal load of 10-20 kw with 4 generators operating.

Observe GCB MIs show inline.

Lift the guard and set EMERG GEN sel to MANUAL and AC FREQ/VOLTS rty sel to EMRG PWR.
Observe volts 110-118 and frequency 390-410. SELECTED lt (blue) on, FAIL lt off, KVA meter indicates 0.

Set EMERG GEN sel to GROUND BYPASS
Observe SELECTED lt off.

The Emergency Generator selector is set to GROUND BYPASS to enable the a.c. essential bus bars to be powered by the Emergency Generator, during take-off and landing, under electrical failure conditions.

Observe the auto shed breaker MI shows inline.
Observe d.c. ammeters indicate loads within limits.

There may be a difference between individual meter indications. Normal operating total dc load is approximately 200 A.

Observe BATT AMPS meters indicate within limits and steady or falling slowly, BATT ISOLATE lts are off.

NOTE: A battery charge reading which is low and steady or falling slowly indicates that the battery is in good condition.

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NORMAL PROCEDURES
AFTER START CHECK

Ground equipment ....CLEAR P.G

Request ground engineer to verify, disconnection of pre-conditioned air truck and access door closed, disconnection of electrical ground truck and access door closed, disconnection of air start truck and access door closed.

AFTER START CHECK LIST ....COMPLETED P

TAXI CHECK

Visor Nose .... DOWN 5° P

IF ...the visor nose is not at 5 deg.

Set VISOR/NOSE lever to VIS/O.
Observe visor moves downwards uplock lt on then off and VISOR MI reads DOWN.

Set VISOR/NOSE lever to 5 DEG.
Observe nose moves downwards, unlock lt off, NOSE MI reads 5 DEG and 5 DEG L lt remains off.

Brakes ....CHECKED/NORM C

This check is to be made while the aircraft is stationary.

Depress brakes pedals
Set brakes control lever to NORM then to EMERG, observe BRAKES EMERG. lt (amber) on and full scale indicated on dual BRAKES pressure gauge. Set brakes control lever to NORM.

Observe BRAKES EMERG lt off, BRAKES FAIL lt off, dual BRAKES pressure gauge reads 0.

NOTE: Do not allow the brakes lever to dwell between NORM and EMERG as there is a position between these settings where the brakes will be inoperative. Even with continuous movement through this position the aircraft may lurch as the brakes come off then on.

Release the pedals.

Landing/taxi/taxi turn lights ....AS REQUIRED C

If lights required set LIGHTS TAXI-TURN sws to ON.
Observe taxi/turn lights on.

Set LIGHTS LANDING TAXI sws to EXTEND and ON
Observe EXTENDED lt (blue) is on, landing taxi lts on.

C.G. Management ....TRIM TRANSFER E

When starting to taxy with a full fuel load the aircraft's C.G. will be beyond the flight limit, and the M/CG warning lights will be on. Fuel must be transferred forward to achieve the correct CG position before beginning the take-off roll.

(Unchanged)

If ...tank 11 contains more than requirement
Set tanks 5, 7 and 9 INLET VALVE MAIN sels to SHUT
Verify tank 11 load limit control at take off value
When there is sufficient space in the collector tanks to accept approximately half the excess fuel in tank 11, set tanks 1,2,3 and 4 STANDBY INLET VALVES sws to OPEN.

Observe MIs read OPEN.
Set the TRIM TRANS AUTO MASTER sel to FORWARD
Observe tank 11 quantity decreasing

When tank 11 quantity reaches the loadsheet value, set the TRIM TRANS AUTO MASTER sel to OFF and guarded.

NOTE: As the excess fuel in tank 11 is intended for pre take-off purposes, the take-off may not proceed until the tank 11 quantity is correct and total fuel remaining is correct.

Set tanks 1,2,3 and 4 STANDBY INLET VALVES sws to SHUT.
Observe MIs read SHUT.

Set tanks 5,7 and 9 INLET VALVES MAIN sels to AUTO.

IF ...tank 11 contains less than requirement
Verify tank 11 load limit control at take-off value.
Set tanks 5 & 7 Inlet Valves main sels to SHUT.
Set the TRIM TRANS AUTO MASTER sel to REARWARD.
Observe tank 11 INLET VALVES MIs show inline, tank 11 quantity increasing and tank 9 quantity decreasing.

When tank 11 quantity reaches the take off value,
Set the TRIM TRANS AUTO MASTER sel to OFF and guarded.
Set tanks 5 & 7 Inlet Valves main sels to AUTO.

Observe c.g. indicators show the required T/O C of G.

Set tank 11 load limit control to initial supersonic cruise value. Should a taxy back to the ramp, following a PTOTR, be necessary, transfer the PTOTR quantity from 11 back to 9 in order to set tank 11 contents to the refuel schedule quantity.

Flight Instruments .... CHKD/NO FLAGS ALL

Observe no failure flags on flight instruments.
Observe and compare indication of all attitude indicators, HSIs and RMIs.

Flight controls/EFC ....CHECKED/LIGHT OFF C

Observe flight control channel MIs read B and no warning lights.
Apply full left wing down control, then full right wing down control and return to neutral.
Observe that control stiffness is normal and the elevons sensibly follow the control movement to full deflection while the rudders deflect 8 deg. Then all surfaces return to neutral.

Push control column fully forward, then pull fully rearward and return to neutral.

Observe that control stiffness is normal and the elevons sensibly follow the control movement to full deflection then return to neutral.

Hold nosewheel steering handle and push the rudder pedals to full left, then to full right and return to neutral.
Observe that control stiffness is normal and the rudders (2) sensibly follow the control movement to full deflection and return to neutral.

TEMPORARY REVISION
Insert to face 06.12 page 02

REASON FOR ISSUE:

Several recent hydraulic pipe failures are attributed to surge in the pipes caused when the hydraulically driven pumps in Tank 11 are switched on for forward fuel transfer. Prior to the embodiment of modified selector valves, use of the hydraulically driven pumps is to be minimised.

ACTION:-

After the line,

Observe M1s read OPEN,

Delete the next four lines and read,

Set the tank 11 Hydraulic Pumps to OFF.

Set the TRIM TRANS AUTO MASTER sel to FORWARD
Observe tank 11 quantity decreasing

When the tank 11 quantity reaches the loadsheet value, set the TRIM TRANS AUTO MASTER sel to OFF and guard.

Set the tank 11 Hydraulic Pumps to AUTO.

Observe flights control channel MIs read B and no warning lights.

Observe EMERG CONT pb lt off.

Trims .... SET ALL

Set pitch to required take-off setting.
Verify that roll and yaw trims are set at neutral.
Confirm elevon and rudder positions on F.C.P.I.

ENG RATING MODE .... TAKE OFF E

Confirm ENG RATING MODE sws (4) at TAKE OFF
Observe only T/O illuminated on the Rating Annunciator.

Auto ignition .... ON E

Set AUTO IGNITION sws (4) to ON.

Throttles .... CHECKED E

Set all Throttle Master sws to the other selection.
Observe - all THROT lts off
- all engines stable
Set all Throttle Master sws back to original selection.

Drain Mast Heaters .... ON E

Confirm DRAIN MAST HTRS sels (3) ON.

ENG FLIGHT RATING .... CLIMB E

Confirm ENG FLIGHT RATING sws (4) at CLIMB.

Press Static Heaters .... ON E

ADS and STBY Heaters .... TT INHIB/ON E

Set ADS/ENGINE PROBE HEATERS sels (2) to TT INHIB. STBY sw ON.

NOTE: Tt INHIB is selected when the aircraft is on the ground to avoid an overheat condition that could cause false total temperature gauge readings or false TMO warnings.

Observe ADS/ENGINE PROBE HEATERS lts (15) off.

NOTE: At Tt INHIB the Tt lights (2) will be on (yellow) if the temperatue is below plus 15 deg C.

Air Intakes ....CHECKED/SET E

Set the RAMP AND SPILL MASTER sws (4) to AUTO and set the guards.
Verify the LANE rty sels (4) are at the position required for the flight.
Observe lane in use lts (4) (green) agree with the lane selected.

Observe all AIR INTAKE panel lts off except lane in use lts (4) (green).
Observe RAMP and SPILL indicators show 0%.

Observe AUX INLET MIs (4) read OPEN.
Momentarily select Reset on the Intake Diagnostic Panel to clear the display.

Engine Control Schedule ....CHECKED E

Confirm ENGINE CONTROL SCHEDULE sel at AUTO and rty sel at FLYOVER (F/O) or NORMAL

Eng. 4 T/O N1 Limiter ....88% E

Set the ENG 4 T/O N_1 LIMITER to 88%.

Air conditioning ....CHECKED/SET E

Observe BLEED VALVES MIs (4) show inline, bleed pressure gauges (4) indicating approximately 20 psi.

Observe COND VALVE MIs (4) show inline.

Observe JET PUMP MIs (4) show inline.

Observe on TEMPERATURE CONTROL panel MASS FLOW gauges (4) are indicating 0.25 kg/sec. approx.

FUEL LP PROTECTION sw ....ARMED E

Confirm FUEL LP PROTECTION sw at ARMED.
Observe MIs (4) show black.

De-air pumps ....ON E

Set tank 10 DE-AIR pump sw to ON.
Observe de-air MI reads ON.

Set tanks 5A and 7A PUMPS (4) to ON.
Observe PUMPS LOW PRESS lt (yellow) on momentarily then off.

Verify TRANS VALVE 5A-5 sw and 7A-7 sw at SHUT.
Observe 5A-5 and 7A-7 MIs crossline.

NOTE: These TRANS VALVES must remain shut during take-off and climb while tanks 5A and 7A pumps are being used for de-aeration.

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Set tank 6 and tank 8 right-hand PUMPS sws to ON
Observe PUMPS LOW PRESS lts (yellow) on momentarily then off.

NOTE: This initiates de-aeration of tanks 6 and 8. No transfer to the collector tanks will occur as tanks 5 and 7 fuel is transferred preferentially.

Set tank 11 DE AIR sw to ON.
Observe PUMPS left hand LOW PRESS lt (yellow) on momentarily then off.

Fuel consumed indication ....CHECKED E

Observe - Fuel Remaining and A/C Weight display decreasing.

Rotate the test knob on each indicator clockwise and hold for 3 seconds.
Observe - associated indicator shows 8s
- Main and Reheat density compensator lights illuminate
- indicators return to normal status with readings increasing.

CAUTION: SHOULD ANY DENSITY COMPENSATOR LIGHT FAIL TO ILLUMINATE ON TEST THE FUEL FLOW SIGNALS FROM THE ASSOCIATED TRANSMITTER MAY BE INACCURATE: REFER TO MEL SECTION 77.

ENGINE FEED PUMPS sws ....ALL ON E

Verify ENGINE FEED PUMPS sws (12) at on.

Fuel crossfeed valves ....SHUT E

Confirm CROSSFEED rty sel (4) are crossline.

Reverse A.S.O.V.s ....CHKD/18°-24° C.E

Set all 4 throttles to idle.

Set both NOZ AIR SOV & WIND DOWN test sels. direct to E and check,

- all 4 Reverse lts. flashing

- all 4 Wind Down lts. on.

NOTE: N_2s may increase or decrease slightly.

Set throttle levers to mid travel
Observe N_{2s} do not increase by more than 6%
Set throttle levers to idle.

Select reverse idle on all 4 engines and check,

- buckets rotate to between 27° and 37° then stop

- Wind Down lts. extinguish

- Reverse lts. continue to flash

- N_2 increases to reverse idle

Cancel reverse by maintaining a steady downward pressure on the reverse levers. The forward baulk will remain engaged until the following action is taken:-

Rotate both test sels. through D to OFF and check,

- buckets return to between 18° and 24°

- reverse lts. extinguish

- reverse levers fully down

- N_2 at idle

NOTE: Position D opens the electrical latch circuit on the ASOVs thus permitting them to re-open.

If ...the Wind Down lt(s) remain out when at position E, carry out the following:-

- set the associated test sel. OFF

- trip, wait 5 secs. then reset the appropriate CB from table 1.

- attempt a further test

TABLE 1

ENG1	REV THRUST ASOV CONT	3-213	G3
ENG2	REV THRUST ASOV CONT	1-213	D7
ENG3	REV THRUST ASOV CONT	1-213	D8
ENG4	REV THRUST ASOV CONT	3-213	G4

If ...the buckets do not move to 27-37 deg.

- set the GROUND IDLE sws to HI

If nil response

- set the SYMMETRIC PAIR of reverse levers to idle/fwd baulk
- set the associated test sel to OFF
- trip, wait 5 secs then reset the appropriate CB from TABLE 1
- attempt a further test.

CAUTION: DO NOT MOVE THE TEST SEL FROM E TO OFF UNTIL THE REVERSE LEVERS ARE DOWN TO THE FORWARD BAULK.

If ...the buckets fail to return to 21° when the test sel is rotated through D to OFF, carry out the following:-

- leave the test sel. at OFF
- trip, wait 5 secs. then reset the appropriate CB from table 2
- reselect D then OFF
- when the buckets are at 21° ± 3°, cancel the reverse selection and attempt a further test.

TABLE 2

ENG1	BUCKET CONT UNIT SUP	14-215	E12
ENG2	BUCKET CONT UNIT SUP	13-215	G14
ENG3	BUCKET CONT UNIT SUP	13-216	C 6
ENG4	BUCKET CONT UNIT SUP	14-216	C 6

If ...the buckets are stuck outside the range 18° - 24° but are within 10° - 27°:-

flight is permitted provided that the take-off performance penalty and the in flight fuel penalty, in sections 5 of the Performance Manual and Cruise Control Manual respectively, are observed.

Engine o/heat...CHECKED E

Set the Overheat test sel. to TCA
Observe - TCA gauges show approx 640°C
- high TCA temp. lights on
- Engine Shut Down Handle lights on
- MWS ENG reds on

TAXI CHECK

Rotate the Overheat test sel clockwise to the next (reset) position.

Observe - TCA guages resume normal indication
- high TCA temp. lights off
- Engine Shut Down Handle lights off
- MWS ENG reds off

Rotate the Overheat test sel to O/HEAT A

Observe - Engine O/heat lights on
- Engine Shut Down Handle lights on
- MWS ENG reds on

Rotate the Overheat Test sel. to the next reset position

Observe - Engine O/heat lights off
- Engine Shut Down Handle lights off
- MWS ENG reds off

Repeat the above test for O/HEAT positions B, C and D

Rotate the Overheat test sel. to OFF

Seats & Harness ....Locked/Power off & Secure ALL

Captain, First Officer and Flight Engineer check seats locked and power off and harness correctly fitted and secure

Cabin/slides ....SECURE/ARMED S

Obtain confirmation from senior cabin crew member that the cabin is secure for take off, all cabin door locking handles are in the fully closed position (checked manually and by reference to the indicators), that the slides are armed and window blinds checked fully up or down.

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Trim tank Contents ....CHECKED E

Confirm the fuel distribution in the trim tanks is as required by the load sheet.

TAXI CHECK

T/O CG sw ....AS REQUIRED EC

E will - set the switch to NORMAL if the T/O CG is 53.5%

OR - set the switch to 54% if the T/O CG is 54% and check Aft limit index moves 0.5%. rearward.

C will - verify which setting is required.

C.G. position ....CHECKED ALL

E. states the C.G. position from his CG. indicator
C and P observe that their CG.Co indicator reading agrees
All check that the CG position is correct for take-off

CAUTION: TAKE OFF CG POSITION OF 54%
IF FUEL USED ON TAXY EXCEEDS THE PLANNED QUANTITY BY MORE THAN 2000 KGS, TAKE OFF AT CG POSITION OF 54% IS NOT PERMITTED. IN THIS EVENT 1500 KGS MUST BE TRANSFERRED FROM TANK 11 TO TANKS 5 & 7 TO ACHIEVE T/O CG OF 53.5%. T/O CG WARNING SWITCH MUST BE RESET TO NORMAL.

AN EXCESS TAXY CONSUMPTION OF 2000 KGS WILL MORE THAN OFFSET THE PERFORMANCE PENALTY OF USING A T/O CG OF 53.5%. THE PERFORMANCE SPEEDS CALCULATED FOR 54% CG TAKE-OFF ARE TO BE USED WITHOUT ALTERATION.

CAUTION: IF THE INDICATED CG POSITION IS NOT WITHIN THE DEFINED LIMITS, TANK CONTENTS MUST NOT BE ADJUSTED TO CONFLICT WITH THE BALANCE CHART REQUIREMENTS.

TAKE OFF MUST NOT BE ATTEMPTED UNTIL THE REASON FOR THE DISCREPANCY IS ESTABLISHED.

Observe the MWS M/CG lt off

CAUTION: TAKE-OFF MUST NOT BE ATTEMPTED WITH A M/CG LIGHT (RED) ON.

Main transfer pumps ....FOUR ON E

Set tank 5 and tank 7 PUMPS sel and sw to ON
Observe PUMPS LOW PRESS lts (yellow) on momentarily then off.
IF ...tanks 5 and 7 are empty, switch on pumps in tanks 6 and 8.

ANTI-SKID R lts ....OFF E

When taxiing above 10 kts, observe all R lights remain off during gentle braking and when rolling freely.

Cont'd.............

TAXI CHECK

NOTES

One R light on during gentle braking above 10 kts, indicates that one wheel is not rotating normally e.g. a flat tyre, the associated brake is broken or the anti-skid system has failed.

The take-off prohibition when any R light is permanently on, does not apply when the aircraft is operated in accordance with the MEL concession, which allows dispatch with a confirmed indication fault which results in one of the R lights being permanently on.

TAXI CHECKLIST .... COMPLETED E

BEFORE TAKE-OFF CHECK

Briefing ....UPDATED C

Captain ensures that crew are fully briefed on latest requirements for take-off and confirms the transition altitude.

Cabin Crew Call ....3 PRESSES E

Press the STEWARD CALL pb three times.

Landing Lights ....AS REQUIRED P

For every take-off, set the TAXI-TURN lts sws to ON.
IF...main landing lights required,
Set LIGHTS MAIN LANDING sws to EXTEND and ON.
Observe EXTENDED lt is on.

NOTE: The main landing lights provide sufficient illumination but if more light is required the LAND TAXI lights may be used. Some buffet may be experienced with these lights extended in flight.

Transponder ....SET P

Confirm required ATC code displayed.

WHEEL O/HEAT light ....OFF P.E

Observe the WHEEL O/HEAT lt is off.

CAUTION: TAKE OFF MUST NOT BE ATTEMPTED WITH WHEEL O/HEAT LIGHT ON.

OVERLOAD MI ....BLACK E

Observe the OVERLOAD MI shows black.

CAUTION: IF THE OVERLOAD MI IS SHOWING A CLOVERLEAF PATTERN THE ANTI-SKID R LIGHTS MUST BE CAREFULLY MONITORED DURING THE TAKE OFF ROLL. IF AT 10 KNOTS THE R LIGHT (WHITE) IS ON, THE TAKE-OFF MUST BE ABANDONED.

GRD IDLE ....HI E

Set the GRD IDLE, ENG 1-4 and 2-3 sws to HI.

Master Warning ....RECALL/INHIBIT C

Press the RECALL pb.
Observe the master warning lights indicate the accepted system status.

Press the INHIBIT pb.
Observe the INHIBIT lts (2) (amber) on.

BEFORE TAKE-OFF CHECK

IF ...INHIBIT lts off
Brief for take-off with inhibit function inoperative.

T/O MONITOR ....ARMED P

Press to arm the T/O MONITOR pb.

Reheat ....ON E

Set REHEAT sels (4) to RHT using the gang bar
Observe REHEAT selected lts (4) (white) on

Pitch Index ....CHECKED ALL

Verify that the pitch indices are correct for take-off.

Radar ....AS REQUIRED C.P

If radar is required, set TILT sel as required between 0 and 15 deg up.

Press NORM pb lt.
Observe NORM pb lt (white) on, STBY pb lt off.

NOTE: When NORM mode is selected, the beam remains conical for maximum range coverage. NORM corresponds to a normal meterological detection.

IF ...no picture
Set TRANSFER rty sel to 2.

Repeat same procedure as for system 1.

On both radar screens set RANGE rty sel as required (30-100-300).

On both radar screens, adjust INT and RANGE MARKS as required.

NOTES: After changing range, allow 30 seconds for the display to settle down. Do not adjust the intensity unless the display remains too dim. Too high a setting of the INT control will result in "blooming" and severe loss of definition.

At 30 nm only one mark appears, at 25 nm. At 100 nm four marks appear, one every 25 nm. At 300 nm six marks appear, one every 50 nm.

BEFORE TAKE-OFF CHECK LIST ....COMPLETED E

AFTER TAKE-OFF CHECK/CLIMB CHECK

Landing gear ....UP, LIGHTS OFF NEUTRAL P.E.

Observe WHEEL O/HEAT lt off
Set L/GEAR lever to UP
Observe landing gear position indication lts go off at the end of the retraction sequence.

Set L/GEAR lever to NEUTRAL
Observe landing gear position indication lts off.

LANDING/LIGHTS ....OFF/RETRACT P

Confirm - landing lights off and retracted, Extended light off
- landing taxi lights off and retracted, Extended light off

CAUTION: IF BLOW BACK HAS OCCURRED, THE LAMP MUST BE MOTORED BACK TO THE FULLY RETRACTED POSITION.

Master warning ....RECALL C

Press the RECALL pb.
Observe the INHIBIT lts (2) off; the master warning lights indicate the accepted system status.

NOTE: This will indicate any faults that occurred while the system was inhibited and which still exist.

ADS and Stby Heaters ....ON E

Set ADS 1 and ADS 2 sels (2) ON
Observe ADS/ENGINE PROBE HEATERS lts (15) off.

CAUTION: THE ADS 1 AND ADS 2 SELECTORS MUST NOT BE SELECTED TO OFF DURING FLIGHT.

NO SMOKING SIGNS ....OFF E

Set NO SMKG sw to OFF

ENG RATING MODE ....FLIGHT E

Verify ENG RATING MODE sws (4) to FLIGHT.
Observe CLB lt (white) on, T/O lt off, CRS lt off.

(Deletion)

AFTER TAKE-OFF CHECK/CLIMB CHECK

Pressurisation .... CHECKED E

Observe - Ground Pressure Relief Valve shut
- unselected system discharge valves shut
- selected system discharge valves in controlling positions
- cabin rate of climb satisfactory.

Visor Nose .... UP/LOCKED E.P

Set VISOR/NOSE lever to UP.
Observe NOSE MI reads UP, VISOR MI reads UP and unlock lt off.

Altimeters .... SET ALL

Set subscale to required setting.

AFTER TAKE-OFF CHECKLIST .... COMPLETED E

CLIMB CHECK

At M = 0.7

Fuel Transfer .... AFT E

Set Trim Trans Auto Master to REARWARD
Observe - tank 9 pumps LP lights flash on start up
- tank 11 Inlet Valves MIs go in line
- tank 11 LH pump stops.

Set tank 11 De-air sw to OFF
Observe tank 11 LH pump LP light off

Observe - tank 9 contents decreasing
- tank 11 contents increasing
- CG moving aft

When the CG is at 55%.
Set the Trim Trans Auto Master to OFF and guarded
Observe - tank 11 Inlet Valves MIs crossline
- transfer ceases

T/O CG sw .... NORMAL E

Verify that the switch is at NORMAL and set the guard.

Brake Fans .... OFF E

Set the brake fans switch to OFF.

Engine Control Schedule .... NORMAL E

Rotate the Engine Control Schedule sel to NORMAL
Observe - HI schedule lights on
- correct response on N_1 and Area gauges.

(Uncha[illegible]d)

AFTER TAKE-OFF CHECK/CLIMB CHECK

Secondary Air Doors ....OPEN E

Observe secondary air doors MIs read OPEN

CAUTION: IF THE SECONDARY AIR DOORS ARE NOT OPEN ABOVE MO.95 NACELLE OVERHEATING WILL OCCUR.

Flight Deck Door ....NORMAL E

Set the flight deck door switch to NORMAL

Seat Belt Signs ....AS REQUIRED E

Set the seat belt signs switch to OFF when no longer required.

Taxi Turn Lts..OFF P

When clear of the terminal area, set the TAXI TURN lts sws to OFF.

Climb Check..COMPLETE E

TRANSONIC CHECK

Auxiliary Inlets..SHUT E

Before the aircraft speed is greater than M = 0.90
Observe AUX INLET vane MI(s) (4) read SHUT.

Secondary Nozzle.................................... <15 DEG E

Observe the SECONDARY NOZZLE instrument indicates less than 15 deg. Supersonic flight is permitted with bucket angles of up to 27°. See Cruise Control Manual for penalty.

NOTE: Reheat must not be selected on any engine indicating a Secondary Nozzle angle greater than 15 degrees.

If.... the buckets have not moved from the take off position, carry out the following procedure:-

1. Trip the associated REV THRUST ASOV CONT C/B (see table)

ENG 1 REV THRUST ASOV CONT	3.213	G3
ENG 2 REV THRUST ASOV CONT	1.213	D7
ENG 3 REV THRUST ASOV CONT	1.213	D8
ENG 4 REV THRUST ASOV CONT	3.213	G4

2. Wait a minimum of 5 secs after tripping C/B
3. Reset associated C/B.

CAUTION

DO NOT TRIP A REV THRUST ASOV CONT CIRCUIT BREAKER IF THE BUCKET POSITION IS 27° OR MORE.

Reheat..ON E

Advance throttle levers fully.
Select Reheats in symmetric pairs - selected lights on.
Observe fuel flow increase, F_T flags appear and area increase: Con lights off, MID schedule lights on.
Start clock for reheat timing.

NOTE: Two reheats are the minimum required for transonic acceleration, however due note must be taken of additional fuel usage with one or two reheats failed.

If the total temperature exceeds approx. 80°C before reheat is selected off, the engine will automatically return to the dry climb values of N_2 N_1 and EGT but the reheat system will continue to function normally.

(Deletion)

TRANSONIC CHECK

Fuel transfer ....................................TRANSFERRING AFT E

Set TRIM TRANS AUTO MASTER sel to REARWARD.
Observe tank 11 INLET VALVES MIs (2) inline.

Observe tank 9 contents decreasing towards zero, tank 11 contents increasing towards load limit.

Observe the CG moving rearwards towards the required value.

If ...The CG position approaches within 0.25% of the AFT bug

Set the TRIM TRANS AUTO MASTER sel OFF until the CG position is midway between the FWD and AFT bugs then set the TRIM TRANS AUTO MASTER sel to REARWARD.

Repeat as necessary.

When tank 11 contents equal the load limit initial cruise quantity.
Observe tank 11 INLET VALVES MIs (2) crossline and contents remain at the initial cruise quantity.

Observe tank 5 and tank 7 inlet valves MIs (2) inline.

Observe the contents of tanks 5 and 7 increasing.

NOTE: In the event of tank 5 and/or tank 7 reaching high level the respective inlet valve(s) will shut until the level falls.

When tank 9 contents are approximately zero.
Observe tank 9 PUMPS LOW PRESS lts (2) yellow on.
Observe tank 10 pump LOW PRESS lts (2) off

NOTES: There is a 4 sec. delay between tank 9 Low Pressure lights illuminating and tank 10 pumps starting in order to prevent tank 10 pumps responding to a transient low pressure. Tank 9 low pressure lights remain on until its pumps are switched off or trim transfer is complete.

(Unchan

Observe the contents of tank 10 decreasing.

When tank 9 LOW PRESS lts (2) (yellow) have been on steady for 20 secs.
Set tank 9 PUMP sels to OFF.

NOTE: The pumps are normally left operating for 20 secs after the LOW PRESS lights are on steady in order to scavenge the tanks.

When tank 10 contents are zero
Observe tank 10 LOW PRESS lts off and tank 5 and tank 7 INLET VALVE MIs show crossline.

Set the TRIM TRANS AUTOMASTER sel to OFF
Observe indicated CG position between 58% and 59.3%.

NOTE: At the completion of the rearward transfer the CG indicator should read between 58% and 59.3%. If the indication is not between these limits the tank 11 INITIAL CRUISE QUANTITY should be checked and the actual CG computed to determine if the CG indicator is in error.

Set the tank 9 and 10 load limit control to 8000 kg
Set the tank 11 load limit control to the load sheet LANDING BALLAST FUEL TANK 11 value.

NOTE: When tank 9 and 10 Load limit control is set to 8000 kg. and the tank 11 load limit control is set to the LANDING BALLAST FUEL TANK 11 value, the trim transfer system is ready for an emergency forward transfer by the TRIM TRANS AUTO MASTER selector providing the associated PUMPS and INLET VALVES selectors are at AUTO. FUEL FWD TRANS SW overrides the load limit control settings.

At M = 1.0

PRESS STATIC HEATERS ....OFF E

Set PRESS STATIC HEATERS sws OFF.

NOTE: The pressurisation static vent heaters should not be operated in supersonic flight as there is a risk of heater damage.

ENGINE ANTI-ICE ....OFF E

Set the engine anti-ice switches to OFF
Observe IGV PRESS lights off.

WING & INTAKE ANTI-ICE ....OFF E

Set the wing and intake anti-ice rty sel to OFF

TRANSPARENCY DE-ICE DEMIST ....OFF P

Verify DV DE-MIST sws OFF, VISOR DE-ICE sws OFF, W/SHIELD DE-ICE sels

At M = 1.1

Secondary Nozzle ....0-5 DEG E

Observe SECONDARY NOZZLE instruments indicate 0-5 deg

For continued supersonic flight with bucket angles between 0° and 27° see Cruise Control Manual section 5 for fuel penalty.

TRANSONIC CHECK

Intake Lanes ....NO.1 TO AUTO A ... E
NO.2 TO AUTO A
NO.3 TO AUTO B
NO.4 TO AUTO B

Rotate the intake lane rotary selector of engines 1 and 2 to AUTO A and engines 3 and 4 to AUTO B. Observe the lane in use lights (green) agree with the selected lanes. This selection avoids the use of control lanes which derive their Mach number from the right hand manometric system, thus avoiding the effects of known differences between the left and right hand systems. Cancel Intake Test Panel lights.

If for any reason the required intake lane is not used during the acceleration from M = 1.1 to the normal cruise Mach number the fact should be logged and reported.

During the acceleration between M = 1.7 and M = 1.95, i.e. with reheat off, the INTAKE PRESSURE RATIO ERROR indicator may show a significant error. The pointer will be to the left of the scale and at temperatures well below ISA the error may be sufficient for the pointer to enter the amber band. As speed is increased toward the normal cruise Mach number the pointer will move progressively back to give a zero error indication.

At M = 1.7

Reheat ....OFF E

At M = 1.7 or when 15 min has elapsed since reheat light up initiated.

Set reheats OFF in symmetric pairs.
Observe engine FUEL flow drops by approximately 35% and FUEL instrument flag reads FE, reheat selected lts off, ENGINE CONTROL SCHEDULE HI lts (white) on, ENGINE CONTROL SCHEDULE MID lts off.

AFCS ....CHECKED CP

Confirm that the same system AP, AT and FD are selected i.e. No.1 AP, No.1 AT and No.1 FD or No.2 AP, No.2 AT and No.2 FD.

WHEN FUEL TRANSFER IS COMPLETE

Fuel tank pressure ....CHECKED E

Above 44,000 feet
Observe the TANK PRESSURE indicator reading slowly increasing.

NOTE: During the climb above 44,000 feet the air pressure in the fuel tanks will slowly increase to a maximum of between 1.2 psi and 1.5 psi.

De-air pumps ....OFF E

Set tank 10 de-air pump and tanks 6 and 8 right hand pumps to OFF.

TRANSONIC CHECK

Tank 5A and Tank 7A ....TRANSFER E

Set TRANS VALVE 5A-5 and 7A-7 sws to OPEN.
Observe TRANS VALVE 5A-5 and 7A-7 MI(s) show inline.

NOTES: This transfer should be made as early as possible after the completion of the trim transfer to prevent excessive kinetic heating of the fuel in tank 5A and tank 7A.

In the event of tanks 5 and/or 7 reaching high level the respective inlet valve(s) will close until the level falls.

When tanks 5A and 7A PUMPS LOW PRESSURE lts (Yellow) come on.
Observe tanks 5A and 7A contents indicators read approximately zero.

When tank 5A and 7A PUMPS LOW PRESS lts (Yellow) have been on for 20 seconds, set PUMPS sws to OFF.
Observe PUMPS LOW PRESS lts off.

NOTE: The pumps are normally left operating for about 20 seconds after the tanks are empty in order to scavenge the tanks.

Set TRANS VALVE 5A-5 sw and TRANS VALVE 7A-7 sw to SHUT.
Observe TRANS VALVE 5A-5 MI and TRANS VALVE 7A-7 MI show crossline.

At FL500

ENG FLIGHT RATING ....CRUISE E

Set ENGINE FLIGHT RATING sws (4) to CRUISE.
Observe CRS lt (white) on, CLB lt off, N1, N2 EGT are sensibly in line.

Intake Lanes ....ALL AUTO A OR B .... E

Set the Intake Lanes to Auto A on outbound sectors and to Auto B on inbound sectors. Cancel Intake Test Panel lights.

TRANSONIC CHECKLIST ....COMPLETED

CRUISE CLIMB

Fuel and CG management ....DURING CRUISE E

Throughout the cruise phase of flight apply as necessary the conditional procedures, CG Aft of 59%.
Longitudinal Trim
Lateral Trim

Monitor the CG position

NOTE

Subject to the CG being at or forward of 59% the optimum elevon angle is half a degree down.

Monitor the elevon displacement in pitch on the flight control position indicator.

NOTE

Pitch displacement of the elevons increases the aircraft drag. To trim the aircraft longitudinally, fuel is transferred from rear to front tanks or by reduced level operation in tanks 1 & 4, thus allowing the elevons to obtain the optimum position of the half a degree down.

Monitor the elevon displacement in roll on the flight control position indicator.

NOTE

Roll displacement of the elevons increases the aircraft drag. To trim the aircraft laterally, fuel is transferred between left and right wing tanks thus allowing the elevons to return to the roll neutral position.

When tank 5 and 7 PUMPS LOW PRESS lts (yellow) are on or their contents indicators read zero, set tank 6 and tank 8 PUMPS sws (4) to ON.
Observe tank 6 and tank 8 PUMPS LOW PRESS lts (yellow) on momentarily then off.

NOTE

This continues the main transfer. Tank 6 is replenishing tank 1 via the left hand pump and tank 2 via the right hand pump. Tank 8 is replenishing tank 3 via the left hand pump and tank 4 via the right hand pump.

When tank 5 and 7 PUMPS LOW PRESS lts (yellow) have been on for 20 seconds set tank 5 and 7 PUMPS sws (4) to OFF.
Observe PUMPS LOW PRESS lts off.

(Unchanged)

Fuel and CG management ....END OF CRUISE E

When tank 6 or 8 contents indicator reads 4000 kg (or before top of descent).

CRUISE CLIMB

Observe TANKS 1 & 4 sw position

IF ...TANKS 1 & 4 sw not at NORM

Set TANKS 1 & 4 sw to NORM.
Observe TANK 1 & 4 MI reads NORM, tank 1 and tank 4 U/FULL lts (yellow) on.
Observe tank 1 & 4 contents indicators show contents increasing, tanks 1 & 4 U/FULL lts go off when tanks 1 & 4 contents indicators read approximately 3300 kg.

NOTE

If tanks 1 & 4 low level operation has been in use, setting TANKS 1 & 4 switch to NORM arms the tank 1 and tank 4 U/FULL light. The U/FULL light will go off when the underfull level is exceeded.

When tanks 6 and 8 PUMPS LOW PRESS lts (yellow) come on.
Observe tank 6 and 8 contents indicators read approximately zero.

When tanks 6 and 8 PUMPS LOW PRESS lts (yellow) have been on for 20 seconds set PUMPS sws (4) to OFF.
Observe PUMPS LOW PRESS lts off.

When any collector tank contents fall to 2500 kg
Set tank 5 and tank 7 INLET VALVE sels to OPEN.
Observe tank 5 and tank 7 INLET VALVE MIs show inline.

Note tank 11 contents
Set tank 11 left hand and right hand PUMPS sels to ON
When tank 5 and tank 7 contents are greater than 100 kg
Set tank 5 and tank 7 PUMPS sws and sels to ON

NOTES

Maintaining 2500 kg in each collector tank ensures adequate pump performance, even in the event of loss of tank pressurisation.

100 Kg in each tank 5 and 7 is the minimum quantity at which both pumps in each tank are sure to be submerged. Waiting for this quantity ensures that the pumps do not start dry.

Transferring cool fuel from tank 11 through tanks 5 and 7 to the collector tanks ensures adequate pump performance in the event of loss of tank pressurisation.

(Deletion)

When CG reaches 57.3%
Set tank 11 left hand and right hand PUMPS sels to AUTO

TEMPORARY REVISION
Insert facing 06.18 page 02

REASON FOR ISSUE:
To eliminate risk of pipe damage due to pump scavenging

ACTION:

Immediately after the first NOTE ignore the line

"When tanks 6 and 8 PUMPS LOW PRESS lts (yellow) come on"

and read in its place:-

When tanks 6 contents read 100 kg or immediately tank 6 left hand PUMPS LOW PRESS lt (yellow) on

Set tank 6 left hand PUMPS sw to OFF

When the tank 6 right hand and tank 8 PUMPS LOW PRESS lts (yellow) come on.

CRUISE CLIMB

Set tank 5 and 7 INLET VALVE sws and sels to AUTO

Observe FUEL TANK PRESSURE indicator reading 1.2 PSI or greater.

NOTE

Normal supersonic cruise operation can be continued, provided the fuel tank pressure is greater than 1.2 psi until any collector tank content reduces to 1000 KG.

DECELERATION AND DESCENT

Warning and Landing Display ....CHECKED C.P

Press and hold the captains warning and landing display TEST pb.
Observe AP light (red), AT light (red), ILS boundaries exceedence warnings (white), aircraft symbol (amber) and LAND 2 and LAND 3 lts (green) and DH lt (amber) on.
Observe, on first officer's warning and landing display, AP light (red) AT light (red) ILS boundaries excedence warnings (white) and aircraft symbol (amber) on.
Observe brief audio warning (cavalry charge) and captain's and first officer's AUTOLAND lt (red) on.
Release TEST pb.

Repeat the test on the first officer's warning and landing display.

NOTE
The two Warning and Landing displays must not be tested simultaneously.

Briefing ....STATED C

Review with crew the briefing sheets, procedures and drills relating to the approach and landing and confirm transition level.

Safety Height ....CHECKED ALL

All crew members check the safety height for each leg of the descent and ensure that adequate terrain clearance is maintained at all times.

ASI bugs ....SET ALL

Set ASI bugs for landing.

Harness ....SECURE ALL

All crew members ensure their safety harnesses are fastened and checked for freedom.

AT THE DECELERATION POINT

ENGINE RECIRCULATION VALVES sws ....OPEN E

Prior to but not more than 5 minutes before retarding the throttle levers set ENGINE RECIRCULATION VALVES sws (4) to OPEN.

Throttles ....ISA-10 deg C or warmer 18 DEG C.E
ISA-11 deg C or colder 24 DEG

Observe the temperature deviation from ISA

IF ...temperature warmer than ISA-10 degrees C
Retard the throttles (4) to 18 degrees

IF....temperature colder than ISA-11 degrees C
Retard the throttles (4) to 24 degrees

NOTE

The throttle lever position of 18 deg or 24 deg, depending on temperature, is necessary to ensure adequate surge margins at speeds greater than M = 1.6.

Tanks 1 & 4..NORM E

Confirm that TANKS 1 & 4 sw is at NORM.

Tank 11 Electric Pumps.......................................OFF E

Set both electric pumps to OFF to prevent CG moving forward too quickly

Fuel transfer...............................TRANSFER FWD E

Set tank 9 + 10 load limit sel to landing value

Observe the CG position and Mach number.

IF....The CG is forward of or equal to 57.5% and
speed is above M = 1.5
Wait until the speed reduces to M = 1.5

IF....The CG is rearward of 57.5% and the speed is above
M = 1.5
Set the TRIM TRANS AUTO MASTER sel to FORWARD
Observe the CG moves forward
When the CG reaches 57.5%.
Observe the Mach number

IF....the speed is above M = 1.5
Set the TRIM TRANS AUTO MASTER to OFF
Wait until the speed reduces to M = 1.5.

Verify the TRIM TRANS AUTO MASTER sel at FORWARD
Observe the CG moves forward
When the CG reaches 55%
Observe the Mach number

IF....The speed is above M = 0.93
Set the TRIM TRANS AUTO MASTER sel to OFF until
the speed reduces to M = 0.93
Then providing a subsonic cruise leg is not
planned set the TRIM TRANS AUTO MASTER to FORWARD

When tank 9 contents equal the preset load limit
Observe tank 9 INLET VALVE MIs (2) show crossline and
tank 5 and tank 7 INLET VALVE MIs show inline.

When contents of tank 5 and tank 7 are over 100 Kg
Verify tank 5 and tank 7 PUMPS sels and sws to ON
Control tank 5 and tank 7 PUMPS to achieve equal quantities
in the collector tanks.

Verify tank 11 contents are equal to the preset landing
ballast quantity.

British airways

4 OCT.79

TEMPORARY REVISION
Insert to face 06.19 page 02

REASON FOR ISSUE:

Several recent hydraulic pipe failures are attributed to surge in the pipes caused when the hydraulically driven pumps in Tank 11 are switched on for forward fuel transfer. Prior to the embodiment of modified selector valves, use of the hydraulically driven pumps is to be minimised.

ACTION:

Replace the action

TANK 11 ELECTRIC PUMPS ....OFF E

by

TANK 11 HYDRAULIC PUMPS .... OFF E

DECELERATION AND DESCENT

Observe tank 5 and tank 7 INLET VALVE MIs show crossline
Set the TRIM TRANS AUTO MASTER sel to OFF.

Observe the CG is forward of 53.8%

When tank 5 and tank 7 LOW PRESS lts (yellow) have been on steady for 20 seconds
Set tank 5 and tank 7 PUMPS sels and sws to OFF.

ENG FLIGHT RATING ....CLIMB E

Set ENG FLIGHT RATING sws (4) to CLIMB.
Observe CLB lt (white) on, CRS lt off.

Throttles ....34 DEG C.E

At M = 1.6

Retard the throttles (4) to 34 degrees

NOTE
The throttle lever position of 34 deg ensures adequate airconditioning flows at speeds greater than M = 1.0.

Throttles ....IDLE C.E

At M = 1.0

Retard the throttles (4) to idle.

NOTE
During the latter stages of the descent and subsequent approach it is possible that rapid movement of the throttles may cause transient operation of the auto ignition system. This will cause the RH IGN and LH IGN lights and the associated START PUMP light to come on momentarily.

Pressurisation ....SET E

On SYS 1 cabin alt sel, rotate knob B to set curser to QNH.
Rotate knob A to set destination airfield height
Rotate knob R to set cabin rate of descent,
white dot is 400 ft/min.

PRESS STATIC HEATERS ....ON E

At M = 1.0 or before descent if subsonic

Verify PRESS, STATIC HEATERS sws (2) at ON.

TRANSPARENCY DE-ICE DEMIST ....ON P

At M = 1.0 or before descent if subsonic

DECELERATION AND DESCENT

Set W/SHIELD DE-ICE sels (2) to LOW.
Observe O/HEAT lts (2) off.

Set VISOR DE-ICE sws (2) to ON.
Observe O/HEAT lts (2) off.

NOTE

The visor heater operates only when the visor is locked up.

Set DV DE-MIST sws (2) to ON.
Observe O/HEAT lts (2) off.

DECELERATION AND DESCENT CHECK LIST ....COMPLETED E

APPROACH CHECK

Landing Briefing .... UPDATED C

Update the landing briefing as necessary.

Taxi Turn Lts .... ON P

For every approach, set the TAXI TURN lts sws to ON.

RAD/INS sws .... RAD ALL

Set both RAD/INS sws to RAD.
Observe on both HSI that RAD and MAG displayed.

Altimeters .... SET/CROSS CHECKED ALL

Standby flags clear
Set bugs to ILSH DH and airfield elevation
Set QNH and cross check settings.

Radio altimeter .... DH SET ALL

Set decision height DH on bugs and crosscheck.

Flight Deck Door sw .... OPEN E

Set the F/D DOOR sw to OPEN.

CABIN SIGNS .... ON

Set FASTEN SEAT BELT sw and the NO SMOKG sw to ON.

Emergency Lights .... ARM E

Confirm the LIGHTS EMERG sel is at ARM

ENG RATING MODE .... TAKE OFF E

Set ENG RATING MODE sws to T/OFF.
Observe T/O lt (white) on, CLB lt off.

Visor/Nose .... DOWN, 5 DEG E.P

Set the Visor/Nose lever to VIS/O
Observe - visor moves downwards
- unlock light on then off
- visor MI reads DOWN
- 5 deg Lock light is off

CAUTION: THE SIMULTANEOUS SELECTION FROM VISOR UP TO NOSE 5° IS PROHIBITED IN FLIGHT UNLESS THE LIMITATION FOR NOSE AT DOWN IS OBSERVED.

Set the Visor/Nose lever to 5 DEG
Observe - nose moves downwards
- unlock light on then off
- nose MI reads 5 DEG
- 5 deg Lock light remains off.

(Unchanged)

Brake Fans .... ON E

Set the Brake Fans sw to ON.

APPROACH CHECK

ENGINE RECIRCULATION VALVES ....SHUT E

Set ENGINE RECIRCULATION VALVES sws to SHUT

ENGINE CONTROL SCHEDULE ....APPROACH E

Rotate ENGINE CONTROL SCHEDULE sel to APPROACH
Observe - correct response on N_1 and Area gauges
- MID lts on.

NOTE: The MID engine control schedule is used for noise abatement during approach to touchdown.

ENGINE FEED PUMPS ....ALL ON E

Verify all ENGINE FEED PUMPS sws at ON.
Observe ENGINE FEED PUMPS LOW PRESS lts OFF.

Fuel crossfeed valves ....SHUT E

Verify CROSSFEED rty sels at crosslined position
Observe CROSSFEED MIs show crossline.

CAUTION: THIS ACTION MUST BE DELETED WHEN THE PROCEDURE "MANAGEMENT WITH ABNORMALLY LOW FUEL QUANTITY" IS BEING USED.

SSB ....AS REQUIRED E

The SSB must be open for cat 3 landings.
The following limitations apply:-

1. All BTBs closed.
2. Three or more main generators serviceable.
3. When one main generator is off-line, the Emergency Generator must be started by MANUAL selection and its voltage and frequency checked within limits (110-118V, 390-410 Hz).

BATT sels ....AS REQUIRED E

The Battery selectors must be set to ESS/MAIN SPLIT for cat 3 landings.

Fuel/weight/CG ....CHECKED E

Update landing data card fuel and weight figures as required.
Verify CG within the landing limits.

ASI BUGS ....SET ALL

Update the ASI bug settings as required.

Seats ....LOCKED: PWR OFF ALL

All crew check seats locked and power off.

QNH ....SET ALL

Verify QNH set on both main altimeters and crosscheck readings.

Autopilot changeover ....CHECKED C

With both autopilots engaged.
Disengage AP1 sw and observe AP1 lt off and
AP2 remains engaged and operating.
Observe on both Warning and Landing displays
LAND 3 lt off and LAND 2 lt (green) on.
Set AP1 sw to engage and observe AP1 lt
(green) on and sw remains at engaged position.
Observe on both Warning and Landing displays
LAND 3 lt (green) on, if electrics split.

NOTE: On re-engagement of AP1 it will engage in the LAND mode provided at lease one flight director is engaged.

APPROACH CHECKLIST ....COMPLETED E

LANDING CHECK

Landing Gear ....DOWN 4 GREENS ALL

Move the guard to the left and set the L/GEAR lever to DOWN. Observe LH, NOSE, T and RH arrow lts (green) (4) on and LH SHORT, RH SHORT, UPPER LOCKS and transit lts off at end of the lowering sequence.

NOTE: Before extending the landing gear by normal control the visor uplock must be released to restore the green system hydraulic supply to the landing gear and door selectors.

Cabin Crew Call ....3 PRESSES E

Press the STEWARD CALL pb 3 times to indicate that landing is imminent.

Nose ....DOWN, GREEN E.P

Set VISOR/NOSE lever to DOWN,
Observe 5 DEG L lt on then off, unlock lt on then off, down lt (green arrow) on, NOSE MI reads DOWN.

Brakes .... CHECKED/NORM P

Verify the brakes lever is at NORM.
Press and release brake pedals.
Observe BRAKES FAIL lt off.

NOTE: This test will confirm that normal brake pressure is available.

Anti-skid ....CHECKED E

Observe brakes ANTI-SKID R lts (white) on

NOTE: The anti-skid system allows brake applications before touchdown if all eight release (R) lights are on.

If ...one R lt off on any one landing gear.
Apply brakes only after touchdown and use with care to prevent burst tyres.

NOTE: NORMAL brake system can still be used with three R lights off.

If ...four or more R lts off, apply procedure USE OF EMERG BRAKES.

Radar ....STANDBY E

Press the STBY pb.

AUX INLET MIs ....OPEN/CROSS HATCHED E

Observe AUX INLET MIs read OPEN or show crosshatched.

SECONDARY AIR DOORS sels ....SHUT E

When the speed is less than 220 knots

Set SECONDARY AIR DOORS sels (4) to SHUT
Observe SECONDARY AIR DOORS MIs (4) read SHUT

NOTE: This prevents the secondary air doors cycling, should the aircraft speed vary around M = 0.26 on the approach.

Yellow System ....CHECKED E

Observe - YELLOW hydraulic system PUMPS MIs (2) read ON
- YELLOW system contents and pressure normal.

Landing/landing taxi/taxi turn lights ....AS REQUIRED C

If lights required
Set LIGHTS MAIN LANDING sws (2) to ON and EXTEND (2).
Observe EXTENDED lt (blue) on.

If additional lighting required
Set LIGHTS LANDING TAXI sws (2) to ON and EXTEND (2)
Observe EXTENDED lt (blue) on.

NOTE: Some buffeting may be experienced with the landing/taxi lights extended in flight.

LANDING CHECKLIST ....COMPLETED E

(Unchanged)

AFTER LANDING CHECK

MASTER WARNING ....INHIBIT C

Press the INHIBIT pb.

GRD IDLE sws .... LO E

Set ENG 1-4 and ENG 2-3 GRD IDLE sws to LO
When clear of runway and at taxiing speed shut down inboard engines to reduce thrust, if system status permits.

RAMP SPILL MASTER sws .... MAN E

Set the RAMP/SPILL MASTER sws (4) to MAN

NOTE
This prevents random indications of failure should the electrical supply to the air intake system be interrupted.

AUTO IGNITION ....OFF E

Set the AUTO IGNITION sws (4) to OFF

PRESS STATIC HEATERS ....OFF E

Set the PRESS STATIC HEATERS sws (2) to OFF.

ADS AND STBY HEATERS ....OFF E

Set the ADS1 and ADS2 probe heater sels to OFF and the STBY sw to OFF.

DRAIN MAST HTRS ....AS REQUIRED E

Set the DRAIN MAST HTRS sels (3) as required.

WING & INTAKE ANTI-ICING ....OFF E

Verify WING AND INTAKE ANTI-ICING MAIN sel OFF, ALTERN sel OFF.
Observe INT lts (2) off, CYCLIC lts (2) off.

W/SHIELD EMERGY DE-ICE sws ....OFF/GUARDED E

Verify the W/SHIELD EMERGY DE-ICE LEFT and RIGHT sws at OFF and guard in position.

FLIGHT CONTROL INVERTERS ....OFF INV P

Set BLUE INVERTER sel to OFF INV and observe flight control channel MIs (8) read G. Set GREEN INVERTER sel to OFF INV.
Observe flight control channel MIs (8) read M.

AFTER LANDING CHECK

NOSE .... 5 DEG E.P

Set VISOR/NOSE lever to 5 deg.
Observe 5 deg L lt on then off, NOSE MI reads 5 deg, unlock lt on then off, down lt off.

LANDING/LANDING TAXI/TAXI TURN LIGHTS .... AS REQUIRED C

Set LIGHTS MAIN LANDING sws to and set LIGHTS.
LANDING TAXI sws as required, set LIGHTS TAXI-TURN sws (2) as required.

TRANSPONDER .... STANDBY E

Set ATC mode sel to STBY.

PRESSURISATION .... CHECKED E

Observe GROUND PRESSURE RELIEF VALVE MI reads OPEN and SYS 1 and SYS 2 discharge valves position indicators FWD and AFT at OPEN.

SSB .... CLOSED E

Verify the SSB sw at CLOSE

BATTERIES .... ON E

Verify the battery sels (2) at BATT ON

BRAKES TEMP lts .... CHECKED E

Observe the BRAKES TEMP FWD and REAR lts (red) (8) are on.

Press each BRAKES TEMP FWD and REAR lt in turn.
Observe temperature when lt pressed.

NOTES

If any reading differs significantly from the others (either above or below) the affected brake must be inspected in accordance with the Maintenance Manual instructions before the next flight.

The non illumination of a BRAKES TEMP light and an abnormally low brake temperature indicate lack of braking on that wheel.

SLIDES .... DISARMED E

Just prior to arriving on chocks make the PA call "Will cabin crew set doors to DISARM now".

(Deletion)

TANK 9 SHUT DOWN FUEL .... 4000 KG E

Observe tank 9 contents are 4000 kg or more

AFTER LANDING CHECK

NOTE

4000 kg in tank 9 ensures stability of the aircraft during unloading of payload and crew.

IF ...tank 9 contents less than 4000kg and fuel is available in tanks 1,2,3 and 4

Verify tank 11 INLET VALVES MIs show crossline
Verify JETTISON MASTER VALVES MIs show crossline
Set tanks 9 INLET VALVES MAIN sel to OPEN
Set tanks 1,2,3 and 4 jettison valves sws to OPEN
Observe tank 9 contents increasing

When tank 9 contents reach 4000 kg
Set tanks 1,2,3 and 4 jettison valves sws to SHUT
Set tank 9 INLET VALVES MAIN sels to AUTO

NOTE

If fuel is not available to increase tank 9 contents to 4000 kg, on first contact with ground request message given to duty officer that tank 9 contents are less than 4000 Kg.

AFTER LANDING CHECKLIST ....COMPLETED E

PARKING CHECK

BRAKES ....PARK C

Set brakes control lever to PARK.

Observe dual BRAKES pressure gauge indicating full scale and BRAKES EMERG lt (amber) on.

LANDING LIGHTS ....OFF/RETRACT

Set the LIGHTS MAIN LANDING, LANDING TAXI and TAXI TURN to RETRACT and OFF. C

EMERGENCY GENERATOR .... AUTO E

Set the Emergency Generator selector to AUTO to prevent the generator attempting to run as Engine No.1 is shut down.

VISOR/NOSE .... UP P

Set VISOR/NOSE lever to UP.

Observe nose then visor move upwards, unlock lt on then off, NOSE MI reads UP, VISOR MI reads UP.

GROUND POWER ....ON E

Observe GRND PWR AVAILABLE lt (white) on.

Set ground power sw to CLOSE and release and generator sels of live generator(s) to off

HP VALVES .... SHUT E

Retard THROTTLE LEVERS (4) to idle. Set HP VALVE sws (4) to SHUT

Observe HP MIs (4) read SHUT, engine(s) run down.

If... engine does not run down
Set LP VALVE sel to SHUT 1 or SHUT 2.

NOTE

When the LP VALVE is used to shut the engine down from idle, up to 20 secs may elapse before an engine run down is positively indicated.

THROTTLE MASTERS .... OFF E

Set THROTTLE MASTER sels (4) to OFF,

Log N1, and N2 overlimit pointer position if limits exceeded.

ANTI-COLLISION LIGHTS.......................... OFF E

Set LIGHTS ANTI-COLN sw to OFF.

FASTEN SEAT BELTS .... OFF E

Set FASTEN SEAT BELTS sw to OFF.

PARKING CHECK

ENGINE ANTI-ICING .... OFF E

Verify ENGINE ANTI-ICING sws (4) OFF.

IGNITION .... OFF E

Verify the ignition rty sel to OFF.

GROUND CONDITIONING .... AVAILABLE E.G

Observe BLEED VALVES MIs (4) show crossline. Set BLEED VALVES sws (4) to shut.

Observe COND VALVE MIs (4) show crossline. Set COND VALVE sws (4) to OFF.

Request ground staff connect pre-conditioned air truck.

TRANSPARENCY DE-ICE, DEMIST .... OFF C

Verify WINDSHIELD DE-ICE sels at OFF.
Verify VISOR DE-ICE sws at OFF
Verify DV DE-MIST sws at OFF.

FUEL PANEL .... GROUND STATE E

Verify fuel panel in ground state, i.e.

Tank 9 INLET VALVE MAIN sels at AUTO, O/RIDE sels at OFF
Tank 9 PUMP sels at OFF
Tank 10 DE-AIR sw at OFF
Tank 10 PUMP sels (2) at OFF
TRIM TRANS AUTO MASTER sel at OFF and guarded
Tank 11 INLET VALVES MAIN sels at SHUT, O/RIDE sels at OFF
Tank 11 PUMP sels (4) at AUTO
Tank 11 DE-AIR sw at OFF
STANDBY INLET VALVES sws (9) at SHUT
Tanks 5A and 7A PUMPS sws at OFF
TRIM PIPE DRAIN sw at SHUT
TRANS VALVE 5A-5 and 7A-7 sws at SHUT
Tanks 5 and 7 PUMPS sels at OFF and guarded
Tanks 5 and 7 PUMPS sws at OFF
Tanks 5 and 7 INLET VALVE MAIN sels at AUTO, O/RIDE sels at OFF
Tanks 6 and 8 PUMPS sws at OFF
INTER CON VALVE (6-7) and (5-8) sws at SHUT
ENGINE FEED PUMPS sws (12) at OFF
Fuel jettison transparent covers shut and JETTISON MASTER VALVES MIs (2) crossline.

BATTERIES .... BATT OFF E

Set battery sels (2) to BATT OFF.
Observe BATT ISOLATE lts (2) (amber) on, battery MIs (4) show crossline, MWS ELECT lt (amber) operates.

4 SEP.78

TEMPORARY REVISION
Insert facing 06.24 page 01

REASON FOR ISSUE:

See TR facing 6.11 page 2.

After the item "Landing Lights ....OFF/RETRACT .... C" complete the following new item:-

EMERG GENERATOR sel ....AUTO ....E

The selector was set to GROUND BYPASS during the After Start check to enable the Emergency Generator to power the a.c. essential bus bars, under electrical failure conditions, during take-off and landing. It is reset to AUTO at this stage to prevent the Generator attempting to run as no. 1 engine is shut down.

Proceed with the remainder of the checklist items from, "Visor Nose ....As required ....P", to completion.

PARKING CHECK

INS .... POST FLT INFO E

Mode Selector must remain in NAV.

Enter ramp co-ordinates as waypoint. Select TEST/AUTO/MAN. Switch to MAN. to prevent auto sequencing beyond waypoint. Select WYPT CHG. Press 0 and the waypoint number of the ramp co-ordinates. Press INSERT button. Select DIST/TIME. The distance is the terminal error of the INS and is used with the block time to extract the drift rate from the chart. Select DSTRK/STS; this will give the direction of the drift. Key 1 and INSERT. Repeat the above procedure for INS in unaided mode. Press TEST button to obtain any malfunction codes present. Record all data on the reverse side of the Fuel Flight Plan.

CHOCKS ....IN POSITION C.G

Request ground crew to confirm aircraft wheel chocks in position.

BRAKES ....NORM C

When chocks in position. Set BRAKES lever to NORM. Observe BRAKES EMERG lt off, dual brakes pressure gauge reads 0.

BRAKE FANS ....AS REQUIRED E

Observe WHEELS O/HEAT lt

IF ...WHEELS O/HEAT lt off
Set BRAKE FANS sw to OFF.

RADIATION METER ....NOTED E

Record millirems reading displayed on counter.

NOTE
After each flight the millirems reading displayed on the counter is logged.

ITEM ....CHECKED E

Read the stored failures
Cancel any failures known to be spurious or caused by faulty procedures.

INS ....RELOAD (TRANSIT) P.E

Set each MSU to STBY then ALIGN. Load Present Position into each INS.
Set each MSU to OFF if the flight deck will be left unattended

PARKING CHECKLIST ....COMPLETED E

STOPOVER CHECK

This check must be performed whenever the planned turnround time is greater than 4 hours.

Air data computers .... OFF E

Set ADC1 and ADC2 sws to OFF.
Observe flags visible on associated instruments.

INS .... OFF E

Set INS 1, INS 2 and INS 3 mode sels to OFF.

Radar .... OFF E

On both radar screens.
Set IND OFF-LEFT-AHEAD-RIGHT rty sel to IND OFF.

Press OFF pb lt on radar controller.
Observe OFF pb lt (white) on.

Flight control inverters .... PWR OFF P

Move the guard and set BLUE INVERTER sel to PWR OFF. Observe FAIL lt (red) on. Move the guard and set GREEN INVERTER sel to PWR OFF and observe FAIL lt (red) on.

Emergency lights .... OFF E

Set LIGHTS EMERG sel to OFF.
Observe sel lt (yellow) on.

NOTE

The OFF position is selected before normal shutdown of electrical power. This isolates the battery supplies in the lighting units and prevents the emergency lights from coming on when ground power is removed thus preventing discharge of the lighting unit batteries.

ENGINE VIBRATION SUPPLY .... OFF E

Set the ENGINE VIBRATION SUPPLY sel to the centre, off, position.

OXYGEN .... OFF E

Press and rotate the CREW SUPPLY rty sel to OFF.

Ground power .... AS REQUIRED E

Set ground power sw to TRIP and release.
Observe GRND PWR AVAILABLE lt on, cockpit panels are electrically dead.

Master c/bs .... TRIP E

Trip the Master c/bs identified by white surround markings.

STOPOVER CHECK

NOTE

The Master c/bs are tripped, while the aircraft is on the ground, to reduce rack heating and prolong instrument life. The Master c/bs are located in the bottom left corner of the following panels:

2.213	13.215	14.215
	13.216	14.216

STOPOVER CHECKLIST ....COMPLETED E

(Unchanged)

FLIGHT ENGINEER'S LEAVING PANEL CHECK

Before leaving the flight deck in flight, the Flight Engineer must perform a scan check of his panel excluding the leg panels, and then complete the following items by check list.

Cabin temperature .... STABLE

Observe the duct and cabin temperatures are stable

C.G. .... CHECKED

Observe that the CG is stable at the correct position for the phase of flight.

Trim Transfer .... CHECKED

Confirm that the TRIM TRANS AUTO MASTER sel is at OFF and guarded. Confirm the TANKS 1 & 4 sw is as required.

Confirm that the tanks, 5,7,9 and 11 INLET VALVE MAIN and O/RIDE sels are at AUTO and OFF respectively and their associated MIs show crossline.

Confirm that tanks, 9, 10 and 11 PUMPS sel are at AUTO

Fuel Transfer .... SAFE

Set both pumps sw/sel of each main transfer tanks, 5,6 7 and 8 that contains fuel to ON. Confirm that each collector tank is being supplied with fuel.

Engine Feed Pumps .... ALL ON

Set the ENGINE FEED PUMPS sws (12) to ON.
Observe the ENGINE FEED PUMPS LOW PRESS lts (12) and ENGINE INLET LOW PRESS lts (4) are off.

Crossfeed .... SHUT

Set the CROSSFEED rty sels (4) to shut
Observe the associated MIs show crossline and ENGINE INLET LOW PRESS lights (4) remain OFF.

Jettison System .... VALVES SHUT/COVER CLOSED

(Deletion)

Confirm that the tanks 1,2, 3 and 4 jettison valve sws are at SHUT, the JETTISON MASTER VALVES sels (2) are at SHUT.
Observe all associated MIs (6) show crossline
Confirm the transparent covers are closed

Emergency Generator .... NORMAL/GROUND BYPASS

Confirm the EMERG GEN NORM/ISOL sw is at NORM and guarded.
Confirm the EMERG GEN sel is at GROUND BYPASS

Checklist Presentations & Application 07.00.05
Drill Index 07.00.09

EMERGENCY/ABNORMAL DRILLS

POWER PLANT

ENGINE FIRE, OVERHEAT OR SEVERE DAMAGE 07.01.01
FOUR ENGINE FLAME OUT ABOVE M = 1.2 07.01.03
FOUR ENGINE FLAME OUT BELOW M = 1.2 07.01.05
Precautionary engine shut down 07.01.02
Throt light on 07.01.02
Engine flame out 07.01.02
Engine in-flight start 07.01.07
Engine high oil temp light on 07.01.08
Reheat light on 07.01.09
Reheat fails to cancel 07.01.09
Inadvertent reverse thrust 07.01.10
Inadvertent forward thrust 07.01.10
EGT instrument light on 07.01.10
Intake hyd light on 07.01.11
Intake light on 07.01.12

Aux inlet MI fails to read open 07.01.15
Aux inlet MI fails to read shut 07.01.15
Intake incidence signal failure light on 07.01.16
Intake N_1 sig and/or lane light on 07.01.16
N_1 reduce light on 07.01.16
Fuel filter light on 07.01.17
Engine inlet low press light on 07.01.17
High Fuel temp light on 07.01.18
Engine anti-icing malfunction 07.01.19
Nozzle light on not associated with ADC failure 07.01.20
Engine Vibration amber warning light on 07.01.21
Continuous engine surge above M = 1.3 07.01.22
Continuous engine surge at or below M = 1.3 07.01.23
Engine malfunction not associated with Throttle light on 07.01.24

FUEL SYSTEM

Fuel jettison 07.02.01
Tank press light on 07.02.03
Management with abnormally low fuel quantity 07.02.04
Failure of tanks 1 & 4 norm mode 07.02.05
Failure of tank 5 or 7 pumps 07.02.06
Failure of tank 6 or 8 pumps 07.02.07
Failure of tank 9 pumps 07.02.08
Total loss of CG data with trim tank FQI serviceable 07.02.10
Total loss of CG data with one trim tank FQI unserviceable 07.02.13
Abnormal CG position 07.02.17

Unchanged

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FLIGHT CONTROLS

SERVO CONTROL SPOOL VALVE JAM 07.03.01
CONTROL COLUMN JAM IN PITCH OR ROLL 07.03.01
Loss of both electric trim systems 07.03.02
Total loss of artificial feel in one axis 07.03.02
Total loss of autostabilization in one axis 07.03.03
Loss of control of one inner elevon 07.03.04
Mech jam light on 07.03.04
Flying control inverter failure 07.03.05
Flying control signalling mode change 07.03.06

HYDRAULIC POWER

LOW HYDRAULIC PRESSURE AT FLYING CONTROLS 07.04.01
Hydraulic tank low level 07.04.03
Yellow hyd fluid o/heat and/or O/press 07.04.04
Blue/Green Hyd fluid o/heat and/or o/press 07.04.04
Effects of loss of hydraulic systems 07.04.05

NAVIGATION

DISCREPANCY BETWEEN ADC 1 AND ADC 2 07.05.02
ADC Failure 07.05.02
Loss of Second ADC 07.05.03
Effect of ADC failure 07.05.04
Failure of INS 07.05.08

ELECTRICAL

FAILURE OF FOUR MAIN GENERATORS 07.06.01
FAILURE OF THREE MAIN GENERATORS 07.06.05
AC main bus light on 07.06.06
AC ess bus light on 07.06.08
Emerg gen o/heat light on 07.06.09
Emerg gen fail light on 07.06.09
Failure of one or two generators 07.06.09
DC ess bus light on 07.06.10
DC main bus light on 07.06.10
CSD light on 07.06.11
CSD oil inlet temp light on 07.06.11
CSD high differential temperature 07.06.11
Battery Fail Light on 07.06.12

LANDING GEAR

LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION 07.07.01
Landing gear standby lowering 07.07.12
Main gear - free fall 07.07.13
Nose gear - free fall 07.07.14
Wheels o/heat light on in flight 07.07.15
Use of brakes in emerg 07.07.16

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VISOR/NOSE

Visor/Nose unlock light on 07.08.01
Nose 5° light on 07.08.01
Visor/Nose standby lowering (Visor up to Nose 5°) 07.08.02
Nose standby lowering (5° to down) 07.08.03
Visor/Nose free fall 07.08.04

AIR CONDITIONING

RAPID DEPRESSURIZATION 07.10.01
EMERGENCY DESCENT 07.10.02
Shutdown of air conditioning groups 07.10.03
Both fwd extract flow lights on 07.10.04
RH or LH fwd extract flow light on 07.10.05
Rear extract flow light on 07.10.06
Failure of windows 07.10.07
Cabin excess pressure 07.10.09
Nac/Wing O/heat on 07.10.10
Duct light on 07.10.11

ICE AND RAIN PROTECTION

Anti-icing left and right int & cyclic lights on 07.12.01
Anti-icing int light on 07.12.02
Anti-icing cyclic light on 07.12.03

FIRE PROTECTION

SMOKE WARNING 07.13.01
FREIGHT HOLD FIRE 07.13.01
AIR CONDITIONING SMOKE 07.13.02
CABIN FIRE 07.13.02
ELECTRICAL SMOKE OR FIRE 07.13.03
Wheel brake fire 07.13.06
Flame sensor light on 07.13.06

MISCELLANEOUS

EMERGENCY LANDING 07.14.01
PASSENGER EVACUATION ON LANDING 07.14.02
DITCHING 07.14.03
Amber radiation light on 07.14.05
Red radiation light on 07.14.05
NORMAL CHECKLISTS 07.15.01

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GENERAL

The drills and checklist contained in this chapter are a reprint of those published in the Emergency and Abnormal Drills booklet.

Where no drills are published for abnormal situations the contents list refers to Section 3 and is annotated with a †

Emergency checklists are identified by titles printed on a black background. Abnormal checklists are identified by black printed titles surrounded by a continuous line.

Flight Operations Division Orders, Section 1, Page 7.7.5, paragraph 6.3., requires that Captains ensure that in any emergency all passengers are briefed on the emergency action they should take.

DRILL PRESENTATION

MEMORY ITEMS

Memory items are those shown above a heavy broken line.

START POINTS

Where several start points are possible they are annotated thus "●▶". Normally each alternative will run to an END// or APPLY PROCEDURE:, however, in certain cases, where the start point is defined by a phase of flight and the drill may continue into the following phase, it will end CONTINUE//.

Example: ●▶ DURING TRANSONIC ACCELERATION (CG 55% OR REARWARD)

CONTINUE WITH NORMAL FUEL HANDLING BUT OBSERVE THE FOLLOWING ....E

1. STOP THE CLIMB IF ELEVON ANGLE EXCEEDS 3° UP.
2. STOP REARWARD TRANSFER IF ELEVON ANGLE EXCEEDS 2° DOWN AT SPEEDS GREATER THAN $M = 1.3$.
3. IF THE CLIMB IS INTERRUPTED, STOP FUEL TRANSFER AND RESTART WHEN THE CLIMB IS CONTINUED.

CONTINUE//

●▶ DURING SUPERSONIC CRUISE

ADJUST TANK QUANTITIES TO MAINTAIN AN ELEVON ANGLE BETWEEN 0 AND 1° DOWN ....E

ADDITIONAL ACTIONS

Where additional actions may be required the clue to the additional action is underlined and annotated as in the following example:-

BATTERY sel .... BATT ON .... E

IF BATTERY AMMETER OFF SCALE
BATTERY sel .... BATT OFF .... E

TRU NORM/ISOL sws .... NORM .... E
DC VOLTS sel .... AFFECTED BUSBAR .... E

ALTERNATIVE PATHS

Where a drill splits into two or more paths, each of which contains its own terminating statement the clue to each path is under lined and annotated as in the following example:-

SERVO CONTROLS YELLOW rty sel ... YELLOW BLUE OR
YELLOW GREEN C

IF YELLOW LEVEL FALLS

WHEN SYSTEM ISOLATION OCCURS
APPLY PROCEDURE : LOW HYDRAULIC PRESSURE
AT FLYING CONTROLS

IF BLUE OR GREEN LEVEL CONTINUES TO FALL
HYD PUMPS OF AFFECTED SYSTEM .... OFF .... E
RELAY JACK sel .... NORMAL C

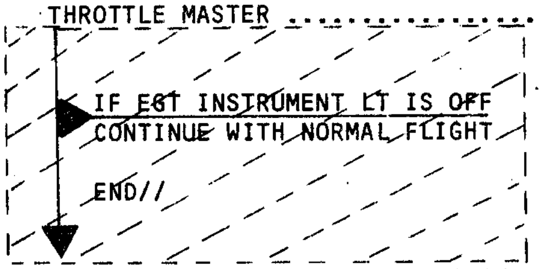
END//

OMITTED ALTERNATIVE PATH

Where it is obvious that an ALTERNATIVE PATH would lead directly to an END// without any further drill actions it has been omitted for clarity of drill and presentation. A simplified example is shown below:-

EGT INSTRUMENT LIGHT ON

THROTTLE MASTER .... OTHER LANE .... E



IF EGT INSTRUMENT LT IS OFF
CONTINUE WITH NORMAL FLIGHT

END//

OMITTED FOR CLARITY

IF EGT INSTRUMENT LT REMAINS ON

EGT AND N_2 ....MAINTAIN WITHIN LIMITS .... E

END//

CHECKLIST APPLICATION

The check list must be read from the beginning and continued until a START POINT or ALTERNATIVE PATH is reached. Select the START POINT or ALTERNATIVE PATH appropriate to the conditions and continue to an END// or APPLY PROCEDURE//.

When an END// is reached the drill actions are complete, however, all NOTES & CAUTIONS at the end of the total drill presentation must be read and complied with, where applicable.

In the case of the obvious omitted END// the NOTES & CAUTIONS must also be read and complied with, where applicable.

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EMERGENCY/ABNORMAL DRILLS

EMERGENCY

POWER PLANT	ENGINE FIRE, OVERHEAT OR SEVERE DAMAGE	07.01.01
	FOUR ENGINE FLAME OUT ABOVE M = 1.2	07.01.03
	FOUR ENGINE FLAME OUT BELOW M = 1.2	07.01.05
FLIGHT CONTROLS	SERVO CONTROL SPOOL VALVE JAM CONTROL COLUMN JAM IN PITCH OR ROLL	07.03.01
HYD	LOW HYDRAULIC PRESSURE AT FLYING CONTROLS	07.04.01
NAV	DISCREPANCY BETWEEN ADC 1 AND ADC 2	07.05.02
	LOSS OF SECOND ADC	07.05.03
ELECTRICAL	FAILURE OF FOUR MAIN GENERATORS	07.06.01
	FAILURE OF THREE MAIN GENERATORS	07.06.05
LANDING GEAR	LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION	07.07.01
AIR COND. AND PRESS	RAPID DEPRESSURIZATION	07.10.01
	EMERGENCY DESCENT	07.10.02
FIRE PROTECTION	SMOKE WARNING FREIGHT HOLD FIRE	07.13.01
	AIR CONDITIONING SMOKE CABIN FIRE	07.13.02
	ELECTRICAL SMOKE OR FIRE	07.13.03
MISC	EMERGENCY LANDING	07.14.01
	PASSENGER EVACUATION ON LANDING	07.14.02
	DITCHING	07.14.03
	GPWS PULL-UP WARNING	07.14.05

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ABNORMAL

POWER PLANT

PRECAUTIONARY ENGINE SHUT DOWN 07.01.02
THROT LIGHT ON 07.01.02
ENGINE FLAME OUT 07.01.02
ENGINE IN-FLIGHT START 07.01.07
ENGINE HIGH OIL TEMP LIGHT ON 07.01.08
REHEAT LIGHT ON 07.01.09
REHEAT FAILS TO CANCEL 07.01.09
INADVERTENT REVERSE THRUST 07.01.10
INADVERTENT FORWARD THRUST 07.01.10
EGT INSTRUMENT LIGHT ON 07.01.10
INTAKE HYD LIGHT ON 07.01.11
INTAKE LIGHT ON 07.01.12

AUX INLET MI FAILS TO READ OPEN 07.01.15
AUX INLET MI FAILS TO READ SHUT 07.01.15
INTAKE INCIDENCE SIGNAL FAILURE LIGHT ON 07.01.16
INTAKE N_1 SIG AND/OR LANE LIGHT ON 07.01.16
N_1 REDUCE LIGHT ON 07.01.16
FUEL FILTER LIGHT ON 07.01.17
ENGINE INLET LOW PRESS LIGHT ON 07.01.17
HIGH FUEL TEMP LIGHT ON 07.01.18
ENGINE ANTI-ICING MALFUNCTION 07.01.19
NOZZLE LIGHT ON NOT ASSOCIATED WITH ADC FAILURE 07.01.20
ENGINE VIBRATION AMBER WARNING LIGHT ON 07.01.21
CONTINUOUS ENGINE SURGE ABOVE M = 1.3 07.01.22
CONTINUOUS ENGINE SURGE AT OR BELOW M = 1.3 07.01.23
ENGINE MALFUNCTION NOT ASSOCIATED WITH THROT LIGHT ON 07.01.24
CON LIGHT ON †03.01.46
ENGINE FAILURE AT OR AFTER V_1 IN THE TAKE-OFF PHASE OF FLIGHT †03.01.48
ENGINE OVERSPEED 03.01.50
INCORRECT SECONDARY NOZZLE POSITION (WITHIN NORMAL FORWARD THRUST RANGE) †03.01.51
SECONDARY AIR DOORS FAIL TO OPEN AFTER TAKE-OFF †03.01.53
HIGH OIL CONT LIGHT ON †03.01.54
FALSE START +03.01.55

(Unchang

FUEL	FUEL JETTISON	07.02.01
	TANK PRESS LIGHT ON	07.02.03
	MANAGEMENT WITH ABNORMALLY LOW FUEL QUANTITY	07.02.04
	FAILURE OF TANKS 1 & 4 NORM MODE	07.02.05
	FAILURE OF TANK 5 OR 7 PUMPS	07.02.06
	FAILURE OF TANK 6 OR 8 PUMPS	07.02.07
	FAILURE OF TANK 9 PUMPS	07.02.08
	TOTAL LOSS OF CG DATA WITH TRIM TANK FQI SERVICEABLE	07.02.10
	TOTAL LOSS OF CG DATA WITH ONE TRIM TANK FQI UNSERVICEABLE	07.02.13
	ABNORMAL CG POSITION	07.02.17
	FAILURE OF TANK 5A OR 7A PUMPS	† 03.02.18
	FAILURE OF TANK 10 PUMP	† 03.02.19
	FAILURE OF TANK 11 PUMP	† 03.02.21
	O/FULL LIGHT ON	† 03.02.22
	ACC LIGHT ON	† 03.02.24
	FAILURE OF ENGINE FEED PUMP	† 03.02.25
	FQI/CG ABNORMAL INDICATIONS	† 03.02.26
FLYING CONTROLS	LOSS OF BOTH ELECTRIC TRIM SYSTEMS	07.03.02
	TOTAL LOSS OF ARTIFICIAL FEEL IN ONE AXIS	07.03.02
	TOTAL LOSS OF AUTOSTABILIZATION IN ONE AXIS	07.03.03
	LOSS OF CONTROL OF ONE INNER ELEVON	07.03.04
	MECH JAM LIGHT ON	07.03.04
	FLYING CONTROL INVERTER FAILURE	07.03.05
	FLYING CONTROL SIGNALLING MODE CHANGE	07.03.06
	LOSS OF ANTI-STALL SYSTEM(S)	† 03.03.02
	LOSS OF ONE AUTOSTABILIZATION SYSTEM	†03.03.03
	LOSS OF ONE ARTIFICIAL FEEL SYSTEM OR ONE ARTIFICIAL FEEL JACK	† 03.03.04
	RELAY JACK BLUE JAM OR GREEN JAM	† 03.03.05
HYD	HYDRAULIC TANK LOW LEVEL	07.04.03
	YELLOW HYD FLUID O/HEAT AND/OR O/PRESS	07.04.04
	BLUE/GREEN HYD FLUID O/HEAT AND/OR O/PRESS	07.04.04
	EFFECTS OF LOSS OF HYDRAULIC SYSTEMS	07.04.05
	HYDRAULIC PUMP LOW PRESSURE	† 03.04.08
	RESERVOIR L/PRESS LIGHT ON	† 03.04.09
NAV	ADC FAILURE	07.05.03
	EFFECT OF ADC FAILURE	07.05.04
	FAILURE OF INS	07.05.08
	NAVIGATION SYSTEM ABNORMAL INDICATIONS	+03.05.05

EMERGENCY/ABNORMAL DRILLS

ABNORMAL

ELECTRICAL	AC MAIN BUS LIGHT ON	07.06.06
	AC ESS BUS LIGHT ON	07.06.08
	EMERG GEN O/HEAT LIGHT ON	07.06.09
	EMERG GEN FAIL LIGHT ON	07.06.09
	FAILURE OF ONE OR TWO GENERATORS	07.06.09
	DC ESS BUS LIGHT ON	07.06.10
	DC MAIN BUS LIGHT ON	07.06.10
	CSD LIGHT ON	07.06.11
	CSD OIL INLET TEMP LIGHT ON	07.06.11
	CSD HIGH DIFFERENTIAL TEMPERATURE	07.06.11
	BATT ISOLATE LIGHT ON	†03.06.16
	TRU OVERHEAT LIGHT ON	†03.06.17
	GENERATOR FAILS TO PARALLEL	†03.06.18
	MANUAL PARALLEL	†03.06.20
L/GEAR	LANDING GEAR STANDBY LOWERING	07.07.12
	MAIN GEAR-FREE FALL	07.07.13
	NOSE GEAR-FREE FALL	07.07.14
	WHEELS O/HEAT LIGHT ON IN FLIGHT	07.07.15
	USE OF BRAKES IN EMERG	07.07.16
	L/G ABNORMAL IND. AFTER UP SELECT	†03.07.12
	UPPER LOCKS LIGHT ON IN FLIGHT	†03.07.13
	LOSS OF NOSEWHEEL STEERING	†03.07.14
	HIGH ENERGY STOP	†03.07.15
	BRAKES OVERLOAD MI SHOWS WHITE	†03.07.16
VISOR/NOSE	VISOR/NOSE UNLOCK LIGHT ON	07.08.01
	NOSE 5° L LIGHT ON	07.08.01
	VISOR/NOSE STANDBY LOWERING (VISOR UP TO NOSE 5°)	07.08.02
	NOSE STANDBY LOWERING (5° TO DOWN)	07.08.03
	VISOR/NOSE FREE FALL	07.08.04
	VISOR FAILS TO RISE	†03.08.08
AIR CONDITIONING & PRESSURIZATION	SHUTDOWN OF AIR CONDITIONING GROUPS	07.10.03
	BOTH FWD EXTRACT FLOW LIGHTS ON	07.10.04
	RH OR LH FWD EXTRACT FLOW LIGHT ON	07.10.05
	REAR EXTRACT FLOW LIGHT ON	07.10.06
	FAILURE OF WINDOWS	07.10.07
	CABIN EXCESS PRESSURE	07.10.09
	NAC/WING O/HEAT LIGHT ON	07.10.10
	DUCT LIGHT ON	07.10.11
	ABNORMAL RATE OF CLIMB AFTER TAKE-OFF	†03.10.13
	BLEED OVERPRESSURE AND/OR OVERPRESS LIGHT ON	†03.10.14
	PRIM EXCH LIGHT ON	†03.10.15
	SEC EXCH LIGHT ON	†03.10.16
	LOSS OF AUTOMATIC TEMPERATURE CONTROL	†03.10.17
	BLEED VALVE MALFUNCTION	†03.10.18
	LEAK LIGHT ON	†03.10.19
	COMPARATOR LIGHT ON	†03.10.20
	FUEL/AIR EXCHANGER OVERHEAT	†03.10.21
	LOSS OF MASS FLOW	†03.10.22

ABNORMAL

ICE & RAIN	ANTI-ICING LEFT & RIGHT INT & CYCLIC LIGHTS ON	07.12.01
	ANTI-ICING INT LIGHT ON	07.12.02
	ANTI-ICING CYCLIC LIGHT ON	07.12.03
	MAST LIGHT ON	†03.12.07
	W/SHIELD DE-ICE O/HEAT LIGHT ON	†03.12.08
	VISOR DE-ICE O/HEAT LIGHT ON	†03.12.09
	DV DEMIST O/HEAT LIGHT ON	†03.12.10
	ADS ENGINE PROBE HEATER	†03.12.11
	WINDSHIELD EMERGENCY DE-ICING	†03.12.13
F.PROT	WHEEL BRAKE FIRE	07.13.06
	FLAME SENSOR LIGHT ON	07.13.06
	FIRE SENSOR LIGHT ON	†03.13.03
MISC	AMBER RADIATION LIGHT ON	07.14.06
	RED RADIATION LIGHT ON	07.14.06
	MWS HEALTH MONITOR	†03.14.03
	DOORS WARNING WITH AIRCRAFT PRESSURISED	†03.14.04

(Unchanged)

ENGINE FIRE, OVERHEAT OR SEVERE DAMAGE

AUDIO	CANCEL	E
ENGINE SHUT DOWN HANDLE	PULL	E

WHEN FIRE FLAPS LT ON (OR HANDLE PULLED + 7 SEC)

1 SHOT	PRESS	E

IF ENGINE SHUT DOWN HANDLE LT FLASHING AFTER 30 SECS

2 SHOT	PRESS	E

SPEED	SUBSONIC	C
ADJACENT ENGINE THROTTLE MASTER	MAIN	E
AUTO THROTTLE MASTER	OFF	E
CSD	DISC	E

IF FIRE PERSISTS

CLEAN UP DRILL	APPLY IMMEDIATELY	E
APPROPRIATE WARNINGS	RESET	E
SYSTEM FAILURE PROCEDURES	APPLY	E

END//

CLEAN UP DRILL

AUTO IGNITION	OFF	E
HP VALVE	SHUT	E
THROTTLE LEVER	IDLE	E
REHEAT	OFF	E
ENGINE RECIRCULATION VALVE	OPEN	E
SECONDARY AIR DOORS	SHUT	E
BLEED VALVE	SHUT	E
CROSS BLEED VALVE	SHUT	E
LP VALVE	SHUT	E
HYD PUMP(S)	SHUT	E
APPROPRIATE WARNING	RESET	E
SYSTEM FAILURE PROCEDURES	APPLY	E

(Deletion)

PRECAUTIONARY ENGINE SHUT DOWN

AUTO THROTTLE MASTER	OFF	E
THROTTLE	IDLE	C
HP VALVE	SHUT	E
ADJACENT ENGINE THROTTLE MASTER	MAIN	E
GENERATOR	OFF	E
REHEAT	ALL OFF	E
SPEED	SUBSONIC	C
SYSTEM FAILURE PROCEDURES	APPLY	E

END//

THROT LIGHT ON

> CAUTION
> WITH REVERSE THRUST SELECTED DO NOT CANCEL REVERSE UNTIL THE THROT LIGHT IS OFF OR THE ENGINE HAS BEEN SHUT DOWN.

THROTTLE MASTER	OTHER LANE	E

IF THROT LT REMAINS ON
APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN

ENGINE FLAME OUT

●▶ IF HP VALVE MI READS SHUT
APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN

●▶ IF HP VALVE MI READS OPEN

THROTTLE MASTER	OTHER LANE	E

APPLY PROCEDURE: ENGINE IN-FLIGHT START

FOUR ENGINE FLAME OUT

ABOVE M=1.2

FUEL FWD TRANS sw	O/RIDE	C
TANK 9 & TANK 10 PUMP sels	VERIFY OFF	E
SERVO CONTROLS YELLOW rty sel	YELLOW GREEN	C
ENGINE FEED PUMPS	ALL ON	E
FWD EXTRACT FANS	ALL ON	E

— — — — — — — — —

THROTTLES	IDLE	C
HP VALVES	SHUT	E
AUTO IGNITION	OFF	E
ENGINE FUEL FEED	CHECK	E
TRIM TRANSFER	CHECK	E
START RELIGHT sels	RELIGHT	E

30 SECS AFTER CLOSURE OF HP VALVES

HP VALVES	OPEN	E

ON ANY ENGINE THAT FAILS TO RELIGHT WITHIN 20 SECS.

HP VALVE	SHUT	E

IF ALL ENGINES FAIL TO RELIGHT

AT APPROXIMATELY M = 1.20

TANK 9 INLET VALVES O/RIDE sels	OPEN	E
TANK 11 GREEN AND BLUE PUMP sels	ON	E
TRIM TRANS AUTO MASTER sel	OFF	E
FUEL FWD TRANS sw	GUARDED	E
RAM AIR TURBINE	DEPLOY	E
REAR EXTRACT STANDBY FAN	ON	E
EMERG GEN	MANUAL	E
AIR INTAKE LANE rty sel	1 & 3 TO A 2 & 4 TO B	E
AIR INTAKE HYD sel	1 TO GREEN 3 TO BLUE 2 & 4 TO YELLOW	E
THROTTLE MASTERS	MAIN	E
F/O ASI AND ALTIMETER	STANDBY MODE	P
ADC 2	OFF	P
EMERG RELIGHT BUSBAR	2	E
ENGINE FUEL FEED	CHECK	E
TRIM TRANSFER	CHECK	E

(Deletion)

contd.

FOUR ENGINE FLAME OUT ABOVE M = 1.2 (continued)

30 SEC AFTER CLOSURE OF HP VALVES
NO 2 ENGINE HP VALVE .... OPEN .... E

CONCURRENT

IF NO.2 ENGINE FAILS TO RELIGHT IN 20 SEC
NO.2 ENGINE HP VALVE .... SHUT .... E
EMERG RELIGHT BUSBAR .... 4 .... E
NO.4 ENGINE HP VALVE .... OPEN .... E

IF NO.4 ENGINE FAILS TO RELIGHT IN 20 SEC
NO.4 ENGINE HP VALVE .... SHUT .... E

REPEAT FOR ENGINES 3 & 1, AND THEN AS NECESSARY

DURING RELIGHT ATTEMPTS
MONITOR MANUAL FORWARD TRANSFER TO ACHIEVE A CG OF 53.5%

IF ALL ENGINES FAIL TO RELIGHT

AT M = 0.90
SERVO CONTROLS BLACK rty sel .... GREEN ONLY ... C

DITCHING & EMERGENCY LANDING DRILLS .. REVIEW ..... ALL
RELIGHT ATTEMPTS .... CONTINUE ..... E

WHEN VISOR/NOSE LOWERING REQUIRED
USE VISOR/NOSE STANDBY LOWERING

AT 10,000 FT
CAPTAINS ASI AND ALTIMETER .... STANDBY MODE . C
ADC 1 .... OFF .... P
SPEED .... 270 KT C
EMERG GEN .... ISOL .... E
RAMP/SPILL MASTERS .... MAN .... E

IF LANDING GEAR LOWERING REQUIRED
LOWER LANDING GEAR USING LANDING GEAR STANDBY LOWERING

BRAKES .... EMERG C

APPROACH SPEED .... 250 KT C
MINIMUM LANDING SPEED .... 200 KT C

END//

(Unchanged)

FOUR ENGINE FLAME OUT
BELOW M=1.2

RAM AIR TURBINE	DEPLOY	E
TANK 9 INLET VALVE O/RIDE sels	OPEN	E
TANKS 5 7 & 11 INLET VALVES O/RIDE sels	SHUT	E
TANK 11 PUMP GREEN AND PUMP BLUE sels	ON	E
SERVO CONTROLS YELLOW rty sel	YELLOW GREEN	C
SERVO CONTROLS BLACK rty sel (IF LESS THAN M = 0.90)	GREEN ONLY	C
ENGINE FEED PUMPS	ALL ON	E

REAR EXTRACT STANDBY FAN	ON	E
EMERG GEN	MANUAL	E
AIR INTAKE LANE rty sel	1 AND 3 TO A 2 AND 4 TO B	E
AIR INTAKE HYD sel	1 TO GREEN 3 TO BLUE 2 AND 4 TO YELLOW	E
THROTTLES	IDLE	C
HP VALVES	SHUT	E
AUTO IGNITION	OFF	E
THROTTLE MASTERS	MAIN	E
F/O ASI AND ALTIMETER	STANDBY MODE	P
ADC 2	OFF	P
START RELIGHT sels	RELIGHT	E
EMERG RELIGHT BUSBAR	2	E
ENGINE FUEL FEED	CHECK	E
TRIM TRANSFER	CHECK	E

30 SEC AFTER CLOSURE OF HP VALVES

NO.2 ENGINE HP VALVE	OPEN	E

CONCURRENT

IF NO.2 ENGINE FAILS TO RELIGHT IN 20 SEC

NO.2 ENGINE HP VALVE	SHUT	E
EMERG RELIGHT BUSBAR	4	E
NO.4 ENGINE HP VALVE	OPEN	E

IF NO.4 ENGINE FAILS TO RELIGHT IN 20 SEC

NO.4 ENGINE HP VALVE	SHUT	E

REPEAT FOR ENGINES 3 & 1, AND THEN AS NECESSARY.

DURING RELIGHT ATTEMPTS

MONITOR MANUAL FORWARD TRANSFER TO ACHIEVE A CG OF 53.5%

contd.

FOUR ENGINE FLAME OUT BELOW M = 1.2 (continued)

⇩

IF ALL ENGINES FAIL TO RELIGHT

AT M = 0.90
SERVO CONTROLS BLACK rty sel .... GREEN ONLY C

DITCHING & EMERGENCY LANDING DRILLS .. REVIEW ...... ALL
RELIGHT ATTEMPTS .... CONTINUE ...... E

▶ IF THE VISOR IS DOWN
VISOR/NOSE STBY CONTROL sw .... VISOR LOWER ... P

▶ IF VISOR/NOSE LOWERING REQUIRED
LOWER VISOR/NOSE USING VISOR/NOSE STANDBY LOWERING
and/or
NOSE STANDBY LOWERING

AT 10,000 FT
CAPTAINS ASI AND ALTIMETER .... STANDBY MODE.. C
ADC 1 .... OFF .... P
SPEED .... 270 KT C
EMERG GEN .... ISOL .... E
RAMP/SPILL MASTERS .... MAN .... E

▶ IF LANDING GEAR LOWERING REQUIRED
LOWER LANDING GEAR USING LANDING GEAR STANDBY LOWERING

BRAKES .... EMERG C

APPROACH SPEED .... 250 KT C
MINIMUM LANDING SPEED .... 200 KT C

END//

ENGINE IN-FLIGHT START

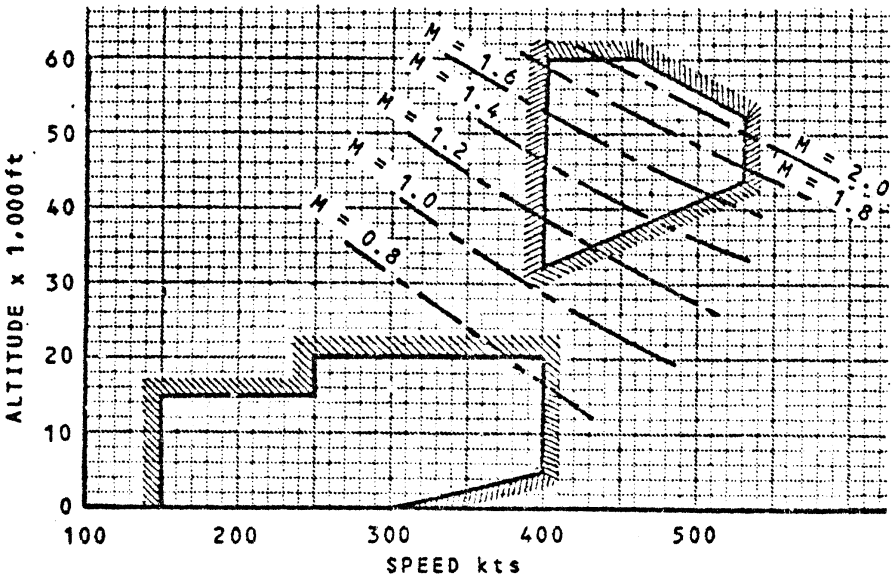
THROTTLE .... IDLE C
HP VALVE .... SHUT .... E
AUTO IGNITION .... OFF .... E
ENGINE FEED PUMPS .... ON .... E
START RELIGHT sel .... RELIGHT .... E

30 SEC AFTER CLOSURE OF HP VALVE
HP VALVE .... OPEN .... E

IF THE ENGINE FAILS TO RELIGHT IN 20 SEC
HP VALVE .... SHUT .... E
ATTEMPT FURTHER RELIGHTS AT LOWER ALTITUDE
OR HIGHER SPEED
(SEE RELIGHT ENVELOPE)

WHEN THE ENGINE IS STABILISED
START RELIGHT sel .... OFF .... E
START PUMP LT .... OFF .... E
SYSTEMS .... RE-ESTABLISH .. E

END//



RELIGHT ENVELOPE

NOTE: Relights may be attempted outside the envelope but may not be successful.

The best area for relight attempts outside the envelope is within 375-400 kt at altitudes below 45000 ft.

(Unchanged)

ENGINE HIGH OIL TEMP LIGHT ON

WITH FUEL TEMPERATURE LESS THAN 70°C
ENGINE RECIRCULATION VALVE ...... OPEN .... E

SPEED .... SUBSONIC C

OIL TEMP .... MONITOR .... E

IF OIL TEMPERATURE STABILIZING AT LESS THAN 190°C
SPEED .... SUBSONIC C

END//

IF OIL TEMPERATURE GREATER THAN 195°C OR
REMAINS ABOVE 190°C FOR 5 MINUTES
APPLY PROCEDURE: PRECAUTIONARY ENGINE
SHUT DOWN

WITH FUEL TEMPERATURE GREATER THAN 70°C
FUEL HEATER .... OFF .... E
OIL TEMP .... MONITOR .... E

IF OIL TEMPERATURE STABILIZING AT LESS THAN 190°C
CONTINUE WITH NORMAL FLIGHT

END//

IF OIL TEMPERATURE RISING TOWARDS LIMITING VALUES
ENGINE RECIRCULATION VALVE ...... OPEN .... E

SPEED .... SUBSONIC C

OIL TEMP .... MONITOR .... E

IF OIL TEMPERATURE STABILIZING AT LESS THAN 190°C
SPEED .... SUBSONIC C

END//

IF OIL TEMPERATURE GREATER THAN 195°C OR
REMAINS ABOVE 190°C FOR 5 MINUTES
APPLY PROCEDURE: PRECAUTIONARY ENGINE
SHUT DOWN

REHEAT LIGHT ON

(Reheat not in use)

● ▶ WITH FUEL FLOW FLAG SHOWING F_E
CONTINUE NORMAL FLIGHT

END//

● ▶ WITH FUEL FLOW FLAG SHOWING F_T

AUTO THROTTLE MASTER	OFF	E
THROTTLE	IDLE	C
HP VALVE	SHUT	E
ADJACENT ENGINE THROTTLE MASTER	MAIN	E
GENERATOR	OFF	E
LP VALVE	SHUT	E
CSD	DISC	E
COND VALVE	OFF	E
SPEED	SUBSONIC	C
SYSTEM FAILURE PROCEDURES	APPLY	E

END//

REHEAT FAILS TO CANCEL

IF FUEL FLOW DOES NOT REDUCE

REHEAT SYSTEM A.C. C/Bs .... TRIP .... E

A.C. CIRCUIT BREAKERS

CIRCUIT BREAKER	PANEL	GRID REF
ENG 1 REHEAT AMP SUP	14-215	C12
ENG 2 REHEAT AMP SUP	13-215	B14
ENG 3 REHEAT AMP SUP	13-216	B7
ENG 4 REHEAT AMP SUP	14-216	D7

END//

INADVERTENT REVERSE THRUST

REV LT FLASHING OR ON STEADY WITH FORWARD THRUST SELECTED

APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUTDOWN

INADVERTENT FORWARD THRUST

REV LT FLASHING OR OFF WITH REVERSE THRUST SELECTED
REVERSE THRUST .... CANCEL C

IF REV LT ON STEADY OR FLASHING
APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN

IF REV LT OFF AND SECONDARY NOZZLE INDICATOR SHOWS LESS THAN 27°
CONTINUE NORMAL FLIGHT BUT DO NOT USE REVERSE THRUST ON ASSOCIATED ENGINE

END//

EGT INSTRUMENT LIGHT ON

THROTTLE MASTER .... OTHER LANE ..... E

IF EGT INSTRUMENT LT REMAINS ON
EGT AND N_2 .... MAINTAIN WITHIN LIMITS .... E

END//

CAUTION

IF THE EGT INSTRUMENT LIGHT IS ON AND THE EGT INDICATION HAS FAILED AND N_2 FALLS BELOW 70% RETARD THROTTLE LEVER TO IDLE AND LEAVE AT IDLE.

DO NOT USE REVERSE THRUST ON ASSOCIATED ENGINE.

ENGINE RELIGHT ATTEMPTS WITH THE EGT INSTRUMENT LIGHT ON ARE ONLY PERMITTED IF THE ASSOCIATED EGT INDICATOR IS WORKING SATISFACTORILY.

INTAKE HYD LIGHT ON

AFFECTED INTAKE .... YELLOW .... E

IF INTAKE HYD LT REMAINS ON
RAMP/SPILL MASTER .... MAN .... E

- APPLY PROCEDURE : INTAKE LIGHT ON

(Deletion)

INTAKE LIGHT ON

AIR INTAKE LANE rty sel .... A .... E

IF INTAKE LT REMAINS ON
AIR INTAKE LANE rty sel .... B .... E

IF INTAKE LT REMAINS ON
RAMP/SPILL MASTER .... MAN .... E

IF NO ASSOCIATED MAIN SYSTEM LOW PRESSURE AND/OR LOW LEVEL WARNING
AFFECTED INTAKE .... BLUE/GREEN ..... E

REHEAT .... ALL OFF .... E

IF SPEED GREATER THAN M = 1.50
SPEED .... REDUCE TO M=1.50.C
AFFECTED INTAKE/ENGINE .... MAINTAIN POINTER BETWEEN AMBER BANDS .... E

IF SPEED IS AT OR LESS THAN M = 1.50
AFFECTED INTAKE/ENGINE .... IDLE C
SPEED .... SUBSONIC C

AT M = 1.30
RAMP .... 0% .... E
SPILL .... 0% .... E

IF RAMP & SPILL DOORS AT 0%
CONTINUE WITH NORMAL DESCENT

END//

IF RAMP & SPILL DOORS NOT AT 0%
AFFECTED INTAKE/ENGINE .... IDLE C

CAUTION
DO NOT USE REVERSE THRUST IN FLIGHT ON AFFECTED INTAKE/ENGINE

contd.

(Unchanged)

INTAKE LIGHT ON (continued)

AT M = 0.60
RAMP POSITION FOR AFFECTED INTAKE/
ENGINE .... OBSERVE .... E

IF RAMP POSITION GREATER THAN 50%
CONTINUE WITH NORMAL DESCENT BUT KEEP AFFECTED INTAKE/ENGINE AT IDLE

END//

IF RAMP POSITION LESS THAN 50%
ENGINE CONTROL SCHEDULE .... LO .... E

IF LO NOT OBTAINED
CONTINUE WITH NORMAL DESCENT BUT KEEP AFFECTED INTAKE/ENGINE AT IDLE

END//

IF LO OBTAINED
AFFECTED INTAKE/ENGINE .... MOVE THROTTLE
SLOWLY C

END//

CAUTION

ON LANDING IF RAMP POSITION GREATER THAN 20% LIMIT REVERSE THRUST TO REVERSE IDLE ON AFFECTED INTAKE/ENGINE. IF RAMP WITHIN RANGE 0-20% NORMAL REVERSE THRUST MAY BE USED.

INTENTIONALLY LEFT BLANK

AUX. INLET MI FAILS TO READ OPEN

● ▶ SPEED IS GREATER THAN 200 KT
CONTINUE NORMAL FLIGHT

CONTINUE//

● ▶ SPEED IS LESS THAN 200 KT
N_2 .... REDUCE TO LESS THAN 85% C

END//

AUX. INLET MI FAILS TO READ SHUT

IF DURING THE EARLY PART OF THE TRANSONIC ACCELERATION

ENGINE SURGE OCCURS
OR
INTAKE PRESSURE RATIO ERROR SIGNIFICANTLY OUT OF LINE WITH OTHER ENGINES AT SPEEDS GREATER THAN $M = 1.30$
OR
P_7 INDICATION SIGNIFICANTLY LOWER THAN OTHER ENGINES

SPEED .... REDUCE TO LESS THAN $M = 0.95$ .. C

END//

INTAKE INCIDENCE SIGNAL FAILURE LIGHT ON

INTAKE .... IDENTIFY .... E
LANE .... OTHER AUTO POSITION .... E

IF α FAILURE LT REMAINS ON
MAINTAIN 1G INCIDENCE WHEN SPEED IS GREATER THAN M = 1.80 WHEREVER POSSIBLE

END//

INTAKE N_1 SIG AND/OR LANE LIGHT ON

LANE .... NON AUTO POSITION TO AGREE WITH LANE IN USE LT ...... E

IF N_1 SIG LT REMAINS ON
MAINTAIN FIXED THROTTLE LEVER ANGLE ON AFFECTED ENGINE WHEN SPEED IS GREATER THAN M = 1.80 WHEREVER POSSIBLE

END//

IF LANE AND N_1 SIG LTS OFF
LANE .... AUTO POSITION TO AGREE WITH LANE IN USE LT . E

END//

N_1 REDUCE LIGHT ON

THROTTLE MASTER .... OTHER LANE .... E

IF N_1 REDUCE LT REMAINS ON
INTAKE .... OTHER AUTO POSITION ...... E

IF N_1 REDUCE LT REMAINS ON
SPEED .... DO NOT EXCEED M = 1.95 C

END//

FUEL FILTER LIGHT ON

CAUTION
WITH THE FUEL FILTER LIGHT ON
A LOSS OF ENGINE POWER MAY OCCUR.

ENGINE RECIRCULATION VALVE .... SHUT .... E
ENGINE FUEL TEMPERATURE .... OBSERVE .... E

IF ENGINE FUEL TEMPERATURE ABOVE + 70°C
CONTINUE WITH NORMAL FLIGHT

END//

IF ENGINE FUEL TEMPERATURE BELOW + 70°C
FUEL HEATER .... ON .... E

WHEN ENGINE FUEL TEMPERATURE ABOVE + 70°C
FUEL HEATER .... OFF .... E
ENGINE FUEL TEMPERATURE .... MONITOR .... E

END//

ENGINE INLET LOW PRESS LIGHT ON

ENGINE FEED PUMPS .... ON .... E
ENGINE RECIRCULATION VALVE .... SHUT .... E

END//

HIGH FUEL TEMP LIGHT ON

ENGINE FUEL HEATER .... OFF .... E
ENGINE FUEL TEMPERATURE .... OBSERVE .... E

IF ENGINE FUEL TEMPERATURE REDUCING
CONTINUE WITH NORMAL FLIGHT

END//

IF ENGINE FUEL TEMPERATURE INCREASING
ENGINE RECIRCULATION VALVE .... OPEN .... E
SPEED .... SUBSONIC C
ENGINE FUEL TEMPERATURE .... MONITOR .... E

IF ENGINE FUEL TEMPERATURE LESS THAN 150°C
SPEED .... REMAIN SUBSONIC. C

END//

IF ENGINE FUEL TEMPERATURE GREATER THAN 150°C FOR 2 MIN
OR EXCEEDS 170°
APPLY PROCEDURE : PRECAUTIONARY ENGINE SHUT DOWN

END//

ENGINE ANTI-ICING MALFUNCTION

● ▶ IGV PRESS LT ON WITH ENGINE ANTI-ICING OFF

ENGINE ANTI-ICING sw .... CYCLE ON/OFF ... E

IF IGV PRESS LT REMAINS ON

UNRESTRICTED ENGINE OPERATION PERMITTED, BUT WITH TOTAL TEMPERATURE GREATER THAN 80°C AND N_2 GREATER THAN 96% DAMAGE MAY OCCUR TO THE No 1 BEARING VIBRATION PICKUP CABLE

END//

● ▶ IGV PRESS LT OFF WITH ENGINE ANTI-ICING ON

▶ IF THROTTLE AT IDLE

N_2 .... INCREASE BY 10% .... E

IF IGV PRESS LT OFF WITH THROTTLE ABOVE IDLE

LEAVE ICING CONDITIONS AS SOON AS POSSIBLE

END//

NOZZLE LIGHT ON NOT ASSOCIATED WITH ADC FAILURE

(ENGINE CONTROL SCHEDULE rty sel AT NORMAL ABOVE M = 1.0)

● ▶ WITH ALL ENGINE CONTROL SCHEDULE LTS INDICATING CORRECT SCHEDULE OPERATION

N_2, N_1 AND EGT .... MONITOR DURING SUPERSONIC CRUISE .... E

IF A SYMMETRIC PAIR OF ENGINES EXCEED OPERATING CRUISE RATINGS AT STATIC TEMPERATURES COLDER THAN - 51°C

THROTTLE MASTERS .... OTHER LANE .... E

END//

● ▶ WITH A SYMMETRIC PAIR OF ENGINE CONTROL SCHEDULE LTS INDICATING INCORRECT SCHEDULE OPERATION

THROTTLE MASTERS .... OTHER LANE .... E

END//

● ▶ WITH ALL ENGINE CONTROL SCHEDULE LTS INDICATING INCORRECT SCHEDULE OPERATION

ENGINE CONTROL SCHEDULE .... ABOVE 220 KT HI E
BELOW 220 KT LO E

N_2, N_1 AND EGT .... MONITOR DURING SUPERSONIC CRUISE .... E

IF ENGINES EXCEED OPERATING CRUISE RATINGS WHEN CRUISING AT STATIC TEMPERATURES COLDER THAN - 51°C.

THROTTLES .... RETARD TO OBSERVE CRUISE RATINGS .... E

END//

ENGINE VIBRATION AMBER WARNING LIGHT ON

●▶ FRONT VIBRATION WARNING

▶ IF ENGINE MALFUNCTION OR GENERAL AIRCRAFT VIBRATION OBSERVED

APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN

IF NO EVIDENCE OF ENGINE MALFUNCTION

N_2 .... REDUCE BY 10% .. E

▶ IF INDICATED VIBRATION LEVEL DOES NOT REDUCE WITH N_2

RETURN TO NORMAL ENGINE HANDLING .... E

END//

IF INDICATED VIBRATION LEVEL REDUCES WITH N_2

N_2 .... ADJUST UNTIL VIBRATION BELOW 5 ... E

IF INDICATED VIBRATION GREATER THAN 5 INS/SEC WITH THROTTLE AT IDLE

APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN

●▶ REAR VIBRATION LEVEL GREATER THAN 4 INS/SEC

REHEAT .... OFF .... E
VIBRATION WARNING .... RESET .... E

END//

(Unchanged)

CONTINUOUS ENGINE SURGE ABOVE M=1.3

CAUTION
IF AT ANY TIME DURING SURGE AN UNUSUALLY RAPID RISE IN EGT OCCURS IMMEDIATELY SHUT DOWN ENGINE

ATTITUDE MAINTAIN

THROTTLES	IDLE	C
THROTTLE MASTERS	ALL OTHER LANE.	E
FUEL FWD TRANS sw	O/RIDE	C
AIR INTAKES	ALL OTHER LANE.	E
INTAKE HYDRAULICS	ALL YELLOW	E
REHEAT	ALL OFF	E

IF SURGING CONTINUES

ENGINE CONTROL SCHEDULE	LO	E
ENGINES	IDENTIFY	E
RAMP	INCH TO 70%	E
SPILL	INCH TO 50%	E

IF SURGING CONTINUES

HP VALVE	SHUT	E
ADJACENT ENGINE THROTTLE MASTER	MAIN	E
AUTOTHROTTLE MASTER	OFF	E
RAMP	INCH TO 100%	E
SPILL	INCH TO 100%	E

IF SURGE STOPS AFTER INITIAL ACTIONS

ADVANCE THROTTLES SINGLY, IF NO SURGE OCCURS RETURN TO FLIGHT PLAN

SHOULD SURGE OCCUR DURING THROTTLE ADVANCE.
RETURN THROTTLE TO IDLE. REDUCE SPEED TO SUBSONIC.
WHEN SPEED LESS THAN M = 1.30 ADVANCE THROTTLE.
IF SURGE OCCURS VERIFY RAMP AT 0% AND SPILL AT 0%.
USE HIGHEST SURGE FREE POWER AVAILABLE
END//

IF SURGE STOPS AFTER 70% RAMP AND 50% SPILL OBTAINED

REDUCE SPEED TO SUBSONIC WHEN SPEED LESS THAN M = 1.30 INCH RAMP TO 0% AND SPILL TO 0%. RETURN ENGINE CONTROL SCHEDULE SELECTOR BACK TO AUTO CONTINUE FLIGHT AT SUBSONIC SPEED USING THROTTLE AS REQUIRED.
END//

IF ENGINE SHUT DOWN

REDUCE SPEED TO SUBSONIC WHEN SPEED M = 1.30 INCH RAMP TO 0% AND SPILL TO 0% RETURN ENGINE CONTROL SCHEDULE SELECTOR TO AUTO. RELIGHT ENGINE, IF SURGE OCCURS WHEN ADVANCING THROTTLE AFTER ENGINE RELIGHT, USE HIGHEST SURGE FREE POWER AVAILABLE.
END//

CONTINUOUS ENGINE SURGE AT OR BELOW M=1.3

CAUTION

IF AT ANY TIME DURING SURGE AN UNUSUALLY RAPID RISE IN EGT OCCURS IMMEDIATELY SHUT DOWN ENGINE

ENGINE .... IDENTIFY ...... E
THROTTLE .... IDLE C
THROTTLE MASTER .... OTHER LANE .... E
AIR INTAKE .... OTHER LANE .... E
INTAKE HYDRAULICS .... YELLOW .... E
REHEAT .... ALL OFF .... E

IF SURGE CONTINUES

RAMP .... INCH TO 0% .... E
SPILL .... INCH TO 0% .... E

IF SURGE CONTINUES

RAMP SPILL MASTER .... AUTO .... E
APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN

END//

IF SURGE OCCURS DURING THROTTLE ADVANCE AFTER CORRECTIVE ACTIONS, VERIFY RAMP AT 0% SPILL AT 0%, USE HIGHEST SURGE FREE POWER AVAILABLE.

END//

(Unchanged)

ENGINE MALFUNCTION NOT ASSOCIATED WITH THROT LIGHT ON

THROTTLE MASTER .... OTHER LANE ...... E

IF CONDITION PERSISTS SUBSEQUENT ACTIONS ARE DEPENDENT ON FAILURE MODE AS FOLLOWS:

● ▶ **INADVERTENT CHANGE OF THRUST OR UNSTABLE RUNNING.**

THROTTLE .... IDLE C

▶ **IF ENGINE STABILISES AT IDLE.**

CONTINUED OPERATION AT IDLE IS PERMITTED PROVIDED ALL OTHER INDICATIONS ARE NORMAL.

END//

IF CONDITION PERSISTS (INADVERTENT CHANGE OF THRUST OR UNSTABLE RUNNING WITH THROTTLE AT IDLE).

APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN

CAUTION

IN THE EVENT OF INADVERTENT INCREASE IN THRUST WITH REVERSE THRUST SELECTED, REVERSE THRUST SHOULD NOT BE CANCELLED UNTIL ENGINE SPEED HAS BEEN REDUCED TO IDLE OR THE ENGINE HAS BEEN SHUT DOWN.

● ▶ **PRIMARY NOZZLE MALFUNCTION**

▶ **IF AREA INDICATES NOZZLE JAMMED AT GREATER THAN 15% OR HAS INADVERTENTLY MOVED TO 84% OR GREATER.**

APPLY PROCEDURE: PRECAUTIONARY ENGINE SHUT DOWN.

contd.

IF AREA INDICATES NOZZLE JAMMED AT 15% OR LESS

SPEED .... SUBSONIC C

NORMAL ENGINE OPERATION IS PERMITTED EXCEPT THAT THE USE OF RE-HEAT OR REVERSE THRUST IS PROHIBITED ON THE AFFECTED ENGINE.
AT MAXIMUM POWER SETTING THE N_2 MAY BE DEPRESSED BY UP TO 5%.

END//

IF IGN LIGHTS AND START PUMP LIGHT ON

AUTO IGNITION .... OFF .... E

END//

WIND DOWN LIGHT ON NOT ACCOMPANIED BY BUCKET MOVEMENT.

THROTTLE .... IDLE C

WIND DOWN C/BS .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
ENG 1 WIND DOWN CONT SUP 1 ENG 1 WIND DOWN CONT SUP 2	5-213 1-213	B1 C7
ENG 2 WIND DOWN CONT SUP 1 ENG 2 WIND DOWN CONT SUP 2	1-213 5-213	F4 C1
ENG 3 WIND DOWN CONT SUP 1 ENG 3 WIND DOWN CONT SUP 2	1-213 5-213	F5 C2
ENG 4 WIND DOWN CONT SUP 1 ENG 4 WIND DOWN CONT SUP 2	5-213 1-213	B2 C8

THROTTLE .... AS REQUIRED C

END//

INTENTIONALLY LEFT BLANK

FUEL JETTISON

CAUTION

WHERE POSSIBLE, AVOID STORMY WEATHER CONDITIONS.
DO NOT ENTER A ZONE WHERE FUEL HAS RECENTLY BEEN JETTISONED.

SPEED	NOT ABOVE M = 0.93	C
REHEAT	ALL OFF	E
TRIM TRANS AUTO MASTER	OFF	E
TANK 11 DE-AIR sw	OFF	E
AFT TRIM sw	NORM	E
TANK 9 CONTENTS	LANDING QUANTITY	E

CAUTION

DURING JETTISON, THE ONLY TRUE INDICATION OF FUEL QUANTITY ON BOARD IS THE TOTAL CONTENTS.
THE TOTAL FUEL REMAINING AND A/C WEIGHT INDICATORS DEPEND ON SIGNALS FROM THE ENGINE FLOWMETERS AND JETTISONED FUEL DOES NOT PASS THROUGH THEM.

NOTE

During jettison the aircraft weight will decrease at approximately 2000 kg per min.

contd.

FUEL JETTISON (continued)

JETTISON AS REQUIRED, MAINTAINING CG WITHIN LIMITS. WHERE POSSIBLE, TRIM TANK FUEL SHOULD BE JETTISONED BEFORE MAIN TANK FUEL

TO JETTISON FROM TRIM TANKS

JETTISON MASTER VALVES ....OPEN .... E
TRIM TRANSFER PUMPS .... ON AS REQ'D .. E

WHEN TANK 9 CONTENTS EQUAL LANDING QUANTITY

TANK 9 PUMPS .... AUTO .... E

WHEN TANK 10 & 11 CONTENTS AS REQUIRED

TANK 10 & 11 PUMPS .... AUTO .... E

TO JETTISON FROM MAIN TANKS

ENGINE FEED PUMPS .... ALL ON .... E
MAIN TRANSFER TANK PUMPS .... ALL ON .... E
TRANS VALVES 5A-5, 7A-7 .... OPEN .... E
COLLECTOR TANK JETTISON VALVES .... OPEN .... E
JETTISON MASTER VALVES .... OPEN .... E

WHEN TOTAL CONTENTS INDICATOR SHOWS THE REQUIRED QUANTITY

COLLECTOR TANK JETTISON VALVES .... SHUT .... E
JETTISON MASTER VALVES .... SHUT .... E
JETTISON MASTER VALVES MIS .... CROSSLINE .... E
JETTISON MASTER VALVES .... OFF .... E

TOTAL FUEL REMAINING .... RESET TO AGREE
WITH TOTAL
CONTENTS ..... E

END//

TANK PRESS LIGHT ON

● ▶ WHEN AIRCRAFT IN CLIMB AND TANK PRESSURE INDICATION IN THE POSITIVE AMBER ARC

O/FULL LTS .... OBSERVE ...... E

▶ IF O/FULL LTS ON

APPLY PROCEDURE: O/FULL LIGHT ON

IF O/FULL LTS OFF

REDUCE RATE OF CLIMB TO MAINTAIN TANK PRESSURE INDICATION WITHIN THE POSITIVE YELLOW OR GREEN ARC .... CE

END//

● ▶ WHEN AIRCRAFT IN CRUISE ABOVE 40,000 FT AND TANK PRESSURE INDICATION APPROXIMATELY ZERO

ENGINE FEED PUMPS .... ALL ON .... E

▶ IF ONE PUMP LOW PRESS LT ON

ENGINE RECIRCULATION VALVE ..... SHUT UNTIL THROTTLE IDLE. E

▶ IF TWO PUMPS LOW PRESS LTS ON (IN ONE TANK)

ENGINE RECIRCULATION VALVE ..... SHUT .... E

ENGINE INLET LOW PRESS LTS .... MONITOR ...... E

▶ IF TWO OR MORE INLET LOW PRESS LTS ON

FLIGHT LEVEL .... 450 OR BELOW . C

IF LESS THAN TWO INLET LOW PRESS LTS ON

TANKS 1 & 4 .... 1500KG MINIMUM.E

TANKS 2 & 3 .... 2500KG MINIMUM.E

IF QUANTITIES CANNOT BE MAINTAINED

FLIGHT LEVEL .... 450 OR BELOW . C

END//

● ▶ WHEN AIRCRAFT IN DESCENT AND TANK PRESSURE INDICATION IN THE NEGATIVE AMBER ARC

REDUCE RATE OF DESCENT TO MAINTAIN TANK PRESSURE INDICATION IN NEGATIVE YELLOW OR GREEN ARC .... CE

END//

MANAGEMENT WITH ABNORMALLY LOW FUEL QUANTITY

CROSSFEED rty sels .... INLINE .... E
MAIN TRANSFER PUMPS .... ALL ON .... E
TRANS VALVES 5A-5 & 7A-7 .... OPEN .... E
TANKS 5A & 7A PUMPS .... ON .... E

WHEN LOW PRESS LTS ON

TANK 5 & 6 LEFT HAND PUMPS .... OFF .... E
TANK 7 & 8 RIGHT HAND PUMPS .... OFF .... E

CAUTION

BALLAST FUEL SHOULD BE USED ONLY IF THE SAFETY OF THE AIRCRAFT WOULD OTHERWISE BE PREJUDICED.

IF TRIM TANK FUEL IS TO BE USED

TANK 5 & 7 INLET VALVES .... OPEN .... E
TRIM TRANSFER PUMPS .... ALL ON .... E
TANK 6 & 8 STANDBY INLET VALVES ...... OPEN .... E

WHEN TANK 9 LOW PRESS LTS ON

TRIM PIPE DRAIN .... OPEN .... E

WHEN TANK 10 & 11 LOW PRESS LTS ON

TANK 9 & 11 INLET VALVES .... OPEN .... E

END//

NOTE

The total usable fuel should be determined by addition of the collector tank CONTENTS indication.

CAUTION

ALL PUMPS AND VALVES SHOULD REMAIN AS SELECTED UNTIL AFTER LANDING

FAILURE OF TANKS 1 & 4 NORM MODE

CROSSFEED .... TO USE FUEL FROM 2 AND/OR 3 E
STANDBY INLET VALVES .... OPEN .... E
SAME SIDE TANK 11 PUMP .... ON .... E

WHEN COLLECTOR TANK(S) ABOVE UNDERFULL LEVEL

TANK 11 PUMPS .... AUTO .... E
STANDBY INLET VALVES .... SHUT .... E

WHEN TRIM TRANSFER IS COMPLETE AND
MAIN TRANSFER TANKS ARE EMPTY.

CROSSFEED .... CEASE .... E

END//

FAILURE OF TANK 5 OR 7 PUMPS

● ▶ BEFORE OR DURING ACCELERATING CLIMB

▶ IF 5-2 OR 7-4 PUMP FAILED
6-2 OR 8-4 PUMP .... OFF .... E
6-1 OR 8-3 PUMP .... ON .... E

FAILED PUMP .... OFF .... E

▶ IF TRIM TRANSFER IS NOT INTO 5 & 7

WHEN THE COLLECTOR TANK APPROACHES LOW LEVEL

APPROPRIATE TANK 6 OR 8 PUMP ... ON .... E

IF TRIM TRANSFER IS INTO 5 & 7
MANAGE TRIM TRANSFER TO TOP UP AFFECTED
COLLECTOR TANKS USING 5 & 7 MAIN INLET
VALVES AND COLLECTOR TANK STANDBY INLET VALVES .. E

WHEN TRIM TRANSFER IS COMPLETE

5 & 7 MAIN INLET VALVES .... AUTO .... E
COLLECTOR TANK STANDBY
INLET VALVES .... SHUT .... E
CROSSFEED .... AS NECESSARY .. E

END//

● ▶ DURING STABILIZED CRUISE, DECELERATION OR DESCENT

FAILED PUMP .... OFF .... E

▶ IF TRIM TRANSFER IS NOT INTO 5 & 7
CROSSFEED .... AS NECESSARY .. E

IF TRIM TRANSFER IS INTO 5 & 7
MANAGE TRIM TRANSFER TO TOP UP AFFECTED
COLLECTOR TANK USING 5 & 7 MAIN INLET
VALVES AND COLLECTOR TANK STANDBY INLET VALVES .. E

WHEN TRIM TRANSFER IS COMPLETE

5 & 7 MAIN INLET VALVES .... AUTO .... E
COLLECTOR TANK STANDBY
INLET VALVES .... SHUT .... E
CROSSFEED .... AS NECESSARY .. E

END//

FAILURE OF TANK 6 OR 8 PUMPS

DURING TAKE-OFF OR ACCELERATING CLIMB

IF THE FAILED PUMP IS ON FOR DE-AERATION
REMAINING PUMP .... ON .... E

FAILED PUMP .... OFF .... E

WHEN REHEAT OFF AND ENG RATING MODE sw AT FLIGHT

CROSSFEED .... AS NECESSARY ... E

END//

DURING STABILIZED CRUISE, DECELERATION OR DESCENT

FAILED PUMP .... OFF .... E
CROSSFEED .... AS NECESSARY ... E

END//

FAILURE OF TANK 9 PUMP

PUMPS AND VALVES IN
TRIM TRANSFER TANKS.........AUTO...... E

● ▶ REARWARD TRIM TRANSFER IN PROGRESS

▶ IF TANK 10 CONTENTS GREATER THAN TANK 9
TANK 9 FAILED PUMP .... OFF .... E

END//

IF TANK 10 CONTENTS LESS THAN TANK 9
TANK 9 FAILED PUMP .... OFF .... E
SAME SIDE TANK 10 PUMP .... OFF .... E

Tank 9 and 11 QUANTITIES .... MONITOR .... E

WHEN TANK 11 QUANTITY REACHES TANK 11 LLC

SAME SIDE TANK 10 PUMP .... AUTO .... E

TANK 9 AND 10 QUANTITIES .... MONITOR .... E

▶ IF TANK 10 EMPTIES BEFORE TANK 9 AND THE
LEFT HAND TANK 9 PUMP HAS FAILED
OPERATING TANK 9 PUMP .... OFF .... E
INTER-CON VALVE (5-8) .... OPEN .... E

ALLOW TANK 5 QUANTITY TO INCREASE BY HALF
THAT REMAINING IN TANK 9

WHEN QUANTITY IN TANK 5 IS AS REQUIRED

INTER-CON VALVE (5-8) .... SHUT .... E
TANK 8 STANDBY INLET VALVE ... OPEN .... E
TANK 7 INLET VALVE MAIN sel .. SHUT .... E
TANK 9 RIGHT HAND PUMP .... AUTO .... E

WHEN TANK 8 CONTENTS ARE RESTORED TO ORIGINAL

TANK 8 STANDBY INLET VALVE ... SHUT .... E
TANK 7 INLET VALVE MAIN sel .. AUTO .... E

END//

contd.

FAILURE OF TANK 9 PUMPS (continued)

IF TANK 10 EMPTIES BEFORE TANK 9 AND THE RIGHT HAND TANK 9 PUMP HAS FAILED

OPERATING TANK 9 PUMP .... OFF .... E
INTER-CON VALVE (6-7) .... OPEN .... E

ALLOW TANK 7 QUANTITY TO INCREASE BY HALF THAT REMAINING IN TANK 9

WHEN QUANTITY IN TANK 7 IS AS REQUIRED

INTER-CON VALVE (6-7) .... SHUT .... E
TANK 6 STANDBY INLET VALVE .... OPEN .... E
TANK 5 INLET VALVE MAIN sel ... SHUT .... E
TANK 9 LEFT HAND PUMP .... AUTO .... E

WHEN TANK 6 CONTENTS ARE RESTORED TO ORIGINAL

TANK 6 STANDBY INLET VALVE .... SHUT .... E
TANK 5 INLET VALVE MAIN sel ... AUTO .... E

END//

IF TANK 9 EMPTIES BEFORE TANK 10

RETURN TO NORMAL PROCEDURES

END//

● FUEL JETTISON IN PROGRESS

PROCEED WITH JETTISON USING THE REMAINING PUMP

END//

TOTAL LOSS OF CG DATA WITH TRIM TANK FQI SERVICEABLE

PUMPS AND VALVES IN
TRIM TRANSFER TANKS ....AUTO............. E

● ▶ DURING SUBSONIC CLIMB (CG FWD OF 55%

SPEED .... REMAIN SUBSONIC C
TANKS 9 & 10 LLC .... TAKE-OFF QUANTITY LESS 2500 KG ...... E

AT M = 0.70

TRIM TRANS AUTO MASTER .... REARWARD ..... E

AT COMPLETION OF AUTOMATIC TRANSFER

CG .... CHECK USING CHART .... E
TANKS 9, 10 & 11 .... ADJUST TO OBTAIN 55% FOR CRUISE 53% FOR DESCENT. E

NOTE

Fuel distribution giving an elevon angle of 2° DOWN will ensure safety at M = 0.93

END//

● ▶ DURING TRANSONIC ACCELERATION (CG 55% OR REARWARD)

CONTINUE WITH NORMAL FUEL HANDLING BUT OBSERVE THE FOLLOWING .... E

1. STOP THE CLIMB IF ELEVON ANGLE EXCEEDS 3° UP.
2. STOP REARWARD TRANSFER IF ELEVON ANGLE EXCEEDS 2° DOWN AT SPEEDS GREATER THAN M = 1.3.
3. IF THE CLIMB IS INTERRUPTED, STOP FUEL TRANSFER AND RESTART WHEN THE CLIMB IS CONTINUED.

CONTINUE//

● ▶ DURING SUPERSONIC CRUISE

ADJUST TANK QUANTITIES TO MAINTAIN AN ELEVON ANGLE BETWEEN 0 AND 1° DOWN .... E

CONTINUE//

TOTAL LOSS OF CG DATA WITH TRIM TANK FQI SERVICEABLE (continued)

● ▶ **DURING DECELERATION AND DESCENT AT SPEEDS GREATER THAN M = 0.93**

TANK 11 ELECTRIC PUMPS	OFF	E
TANK 11 LLC	2500 Kg	E
TANKS 9 & 10 LLC	EXISTING QUANTITY PLUS 2500 Kg	E
TRIM TRANS AUTO MASTER	FORWARD	E

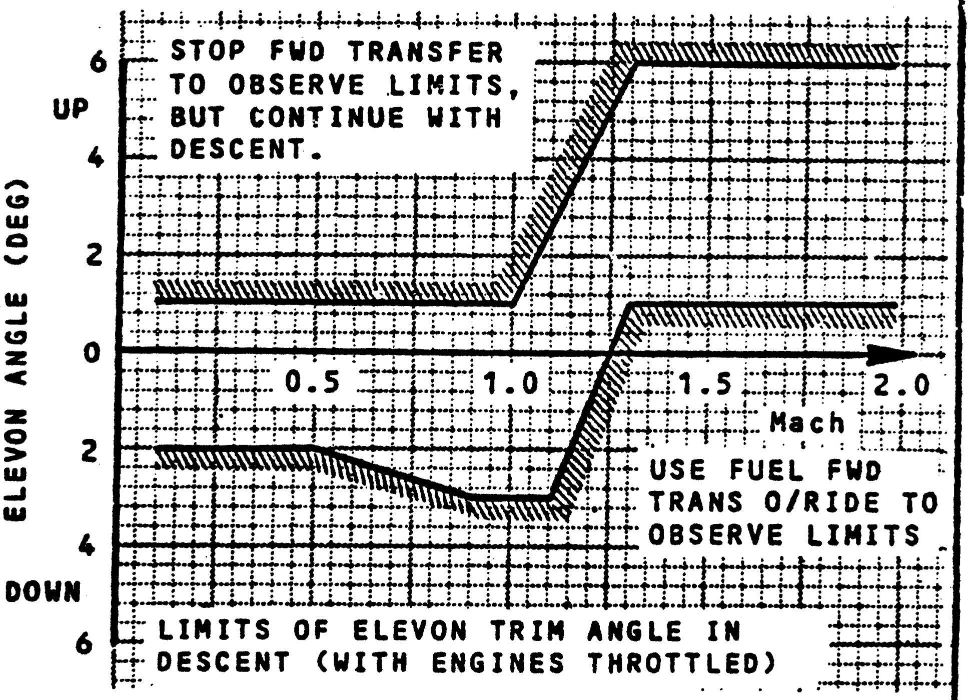
AT END OF AUTO TRANSFER

TRIM TRANS AUTO MASTER	OFF	E

CONTINUE//

CAUTION

1. AFTER THROTTLING FOR DESCENT MONITOR ELEVON ANGLE IN ORDER TO OBSERVE THE LIMITATIONS DEFINED ON FIGURE BELOW



2. IF THE DESCENT IS INTERRUPTED, STOP FUEL TRANSFER AND RESTART WHEN THE DESCENT IS CONTINUED.

contd.

TOTAL LOSS OF CG DATA WITH TRIM TANK FQI SERVICEABLE (continued)

● ▶ **DURING DESCENT OR CRUISE AT M = 0.93 OR LESS**

CG .... CHECK USING CHART .... E

TANKS 9, 10 & 11 .... ADJUST TO OBTAIN
55% FOR CRUISE
53% FOR DESCENT. E

NOTE

Fuel distribution giving an elevon angle of 2° DOWN will ensure safety at M = 0.93.

END//

CG Computation Chart page 07 .02.16

TOTAL LOSS OF CG DATA ONE TRIM TANK FQI UNSERVICEABLE

PUMPS & VALVES IN
TRIM TRANSFER TANKS .... AUTO .... E

● ▶ DURING SUBSONIC CLIMB (CG FWD OF 55%)

SPEED .... REMAIN SUBSONIC C

At M = 0.70

TRIM TRANSFER .... REARWARD MANUAL CONTROL . E

▶ IF TANK 9 FQI UNSERVICEABLE WHEN TANK 11 QUANTITY EQUALS TAKE-OFF VALUE PLUS 2500 KG
TRIM TRANSFER .... CEASE .... E

▶ IF TANK 11 FQI UNSERVICEABLE WHEN TANK 9 QUANTITY EQUALS TAKE-OFF VALUE LESS 2500 KG
TRIM TRANSFER .... CEASE .... E

AT COMPLETION OF TRANSFER

CG .... CHECK USING CHART .... E

TANKS 9, 10 & 11 .... ADJUST TO OBTAIN 55% ..... E

NOTE

Fuel distribution giving an elevon angle of 2° DOWN will ensure safety at M = 0.93

END//

● ▶ DURING TRANSONIC ACCELERATION (CG 55% OR REARWARD)

CONTINUE WITH NORMAL FUEL HANDLING BUT OBSERVE THE FOLLOWING .... E

1. STOP THE CLIMB IF ELEVON ANGLE EXCEEDS 3° UP.
2. STOP REARWARD TRANSFER IF ELEVON ANGLE EXCEEDS 2° DOWN AT SPEEDS GREATER THAN M = 1.3.
3. IF THE CLIMB IS INTERRUPTED, STOP FUEL TRANSFER AND RESTART WHEN THE CLIMB IS CONTINUED.

CONTINUE//

● ▶ DURING SUPERSONIC CRUISE

ADJUST TANK QUANTITIES TO MAINTAIN AN ELEVON ANGLE BETWEEN 0 AND 1° DOWN .... E

CONTINUE//

TOTAL LOSS OF CG DATA WITH ONE TRIM TANK FQI UNSERVICEABLE (continued)

● ▶ DURING DECELERATION AND DESCENT AT SPEEDS GREATER THAN M = 0.93

TANK 11 ELECTRIC PUMPS .... OFF .... E

TRIM TRANSFER .... FORWARD MANUAL CONTROL .... E

▶ IF TANK 9 FQI UNSERVICEABLE
WHEN TANK 11 QUANTITY 2500 KG
BELOW LEVEL AT TIME OF FAILURE
11 TO 9 TRANSFER .... CEASE .... E

WHEN TANK 11 QUANTITY 2500 KG

11 TO 5 & 7 TRANSFER .... CEASE .... E

▶ IF TANK 11 FQI UNSERVICEABLE
WHEN TANK 9 QUANTITY 2500 KG
ABOVE LEVEL AT TIME OF FAILURE

11 TO 9 TRANSFER .... CEASE .... E

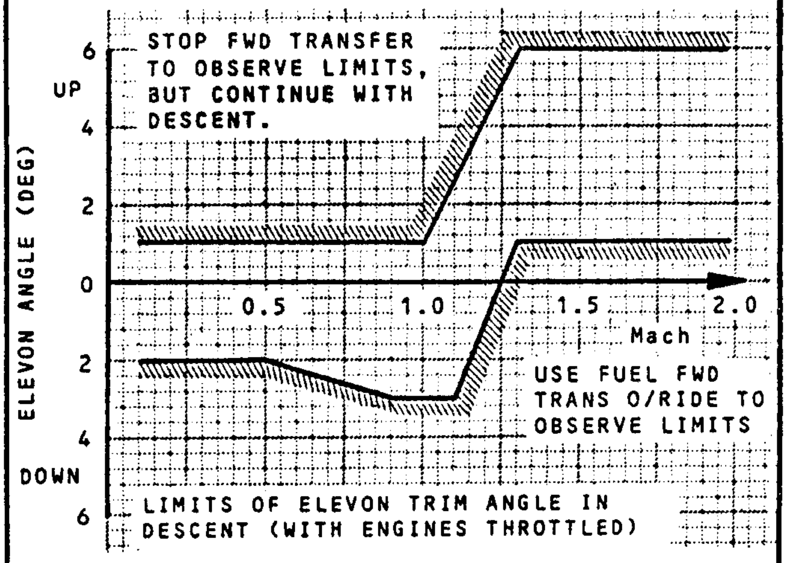
WHEN TOTAL FUEL REMAINING MINUS TOTAL
OF TANKS 1 TO 10 EQUALS APPROXIMATELY 2500 KG

11 TO 5 & 7 TRANSFER .... CEASE .... E

CAREFULLY MONITOR THE ELEVON ANGLE

CAUTION

1. AFTER THROTTLING FOR DESCENT MONITOR ELEVON ANGLE IN ORDER TO OBSERVE THE LIMITATIONS DEFINED ON FIGURE BELOW



LIMITS OF ELEVON TRIM ANGLE IN DESCENT (WITH ENGINES THROTTLED)

2. IF THE DESCENT IS INTERRUPTED, STOP FUEL TRANSFER AND RESTART WHEN THE DESCENT IS CONTINUED.

contd.

CONTINUE//

TOTAL LOSS OF CG DATA WITH ONE TRIM TANK FQI UNSERVICEABLE (continued)

DURING DESCENT OR CRUISE AT M = 0.93 OR LESS

CG	CHECK USING CHART .... E
TANKS 9, 10 & 11	ADJUST TO OBTAIN 55% FOR CRUISE 53% FOR CONTINUED DESCENT ...... E

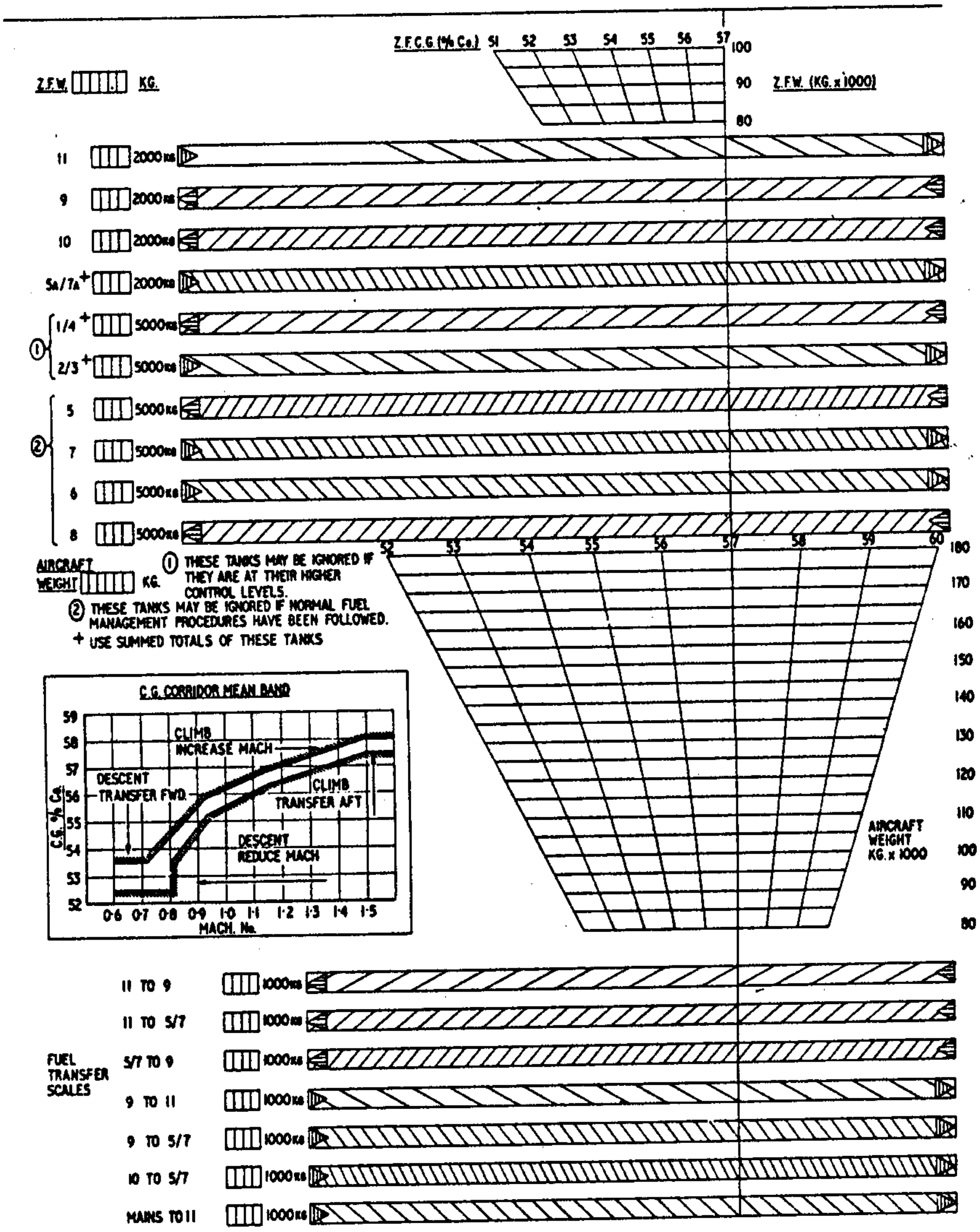
NOTE

Fuel distribution giving an elevon angle of 2° DOWN will ensure safety at M = 0.93

END//

contd. CG Computation Chart page 07.02.16

CG COMPUTATION CHART



NOTE

The following provides a reasonably accurate guide to the fuel quantity required to achieve the specified C.G. shift.

Fuel Quantity	Tanks Affected	C.G. Shift
1% of aircraft weight	11 ⇄ 9	1% Co
1% of aircraft weight	11 ⇄ Collectors	½% Co

ABNORMAL CG POSITION

● ▶ AFT LIMIT

MACH NO. .... INCREASE IF POSSIBLE .. C
FUEL FWD TRANS sw .... O/RIDE C
TRIM TRANSFER PUMPS AND VALVES .... AUTO ...... E
TRIM TRANS AUTO MASTER .... OFF .... E

WHEN NORMAL CG POSITION ACHIEVED
RETURN TO NORMAL TRANSFER CONTROL.

END//

● ▶ FORWARD LIMIT

MACH NO. .... DECREASE IF POSSIBLE .. C
FUEL FWD TRANS sw .... OFF & GUARDED ... C
TRIM TRANS AUTO MASTER .... OFF .... E

▶ IF TANK 9 OR 10 CONTAINS FUEL

TRIM TRANSFER PUMPS AND VALVES .... AUTO ...... E
TANKS 9 & 11 LLC .... ADJUST .... E
TRIM TRANS AUTO MASTER .... REARWARD .. E

WHEN NORMAL CG POSITION ACHIEVED
RETURN TO NORMAL TRANSFER CONTROL

END//

▼ IF TANKS 9 AND 10 EMPTY

TANK 11 INLET VALVES .... OPEN ...... E
TANK 2 & 3 JETTISON VALVES .... OPEN ...... E

WHEN NORMAL CG POSITION ACHIEVED

TANK 11 INLET VALVES .... AUTO ...... E
TANK 2 & 3 JETTISON VALVES .... SHUT ...... E

RETURN TO NORMAL TRANSFER CONTROL

END//

INTENTIONALLY LEFT BLANK

SERVO CONTROL SPOOL VALVE JAM

SERVO CONTROLS BLACK rty sel .... TOWARDS JAM LT C

IF THE BLACK rty sel WILL NOT MOVE

SERVO CONTROLS YELLOW rty sel .... NORMAL C
SERVO CONTROLS BLACK rty sel .... TOWARDS JAM LT C

IF SPEED GREATER THAN M = 0.93

REDUCE SPEED TO 350 KT AT CONSTANT PRESSURE ALTITUDE
THEN DESCEND AT 350 KT TO M = 0.93

END//

NOTE:

Should low pressure in the remaining main system occur, yellow system will be automatically selected to replace it.

CONTROL COLUMN JAM IN PITCH OR ROLL

CAUTION

THE EMERGENCY FLIGHT CONTROL SYSTEM IS TO BE USED ONLY IN THOSE CASES OF JAMMING WHERE FORCE ON THE CONTROL COLUMN/WHEEL PRODUCES, IN THE PARTICULAR AXIS, NO MOVEMENT OF THE COLUMN/WHEEL IN THE DIRECTION DEMANDED.

AUTOSTAB (PITCH & ROLL) ....ENGAGED............... C
CONTROL FORCES ....RELAX C
EMERGENCY FLIGHT CONTROL ....ENGAGE................ C

END//

LOSS OF BOTH ELECTRIC TRIM SYSTEMS

CAUTION

WITH BOTH ELECTRIC TRIM SYSTEMS DISENGAGED THE AUTOMATIC PITCH STABILITY CORRECTION IS LOST. HIGH INCIDENCE PROTECTION IS CONSIDERABLY REDUCED.

▶ IF MANUAL TRIM JAMMED

PITCH ARTIFICIAL FEEL .... OFF .... P

FLY THE AIRCRAFT WITH CAUTION AS THE CONTROL FORCES ARE REDUCED.

IN SUBSONIC CRUISE, LIMIT THE AFT CG TO 55% AND THE MACH NO. TO M = 0.93.
STICK WOBBLER IS LOST.

AT LANDING
MINIMUM SPEED .... V_{REF} + 10 kts... C

END//

TOTAL LOSS OF ARTIFICIAL FEEL IN ONE AXIS

FLY THE AIRCRAFT WITH CAUTION AS THE CONTROL FORCES ARE REDUCED.

●▶ IF PITCH AXIS IS LOST

IN SUBSONIC CRUISE, LIMIT THE AFT CG TO 55% AND THE MACH NO. TO M = 0.93
STICK WOBBLER IS LOST.

END//

(Unchange

●▶ IF YAW AXIS IS LOST

USE RUDDER WITH CAUTION AND ONLY SUFFICIENT TO PREVENT SIDESLIP.

END//

TOTAL LOSS OF AUTOSTABILIZATION IN ONE AXIS

FLY THE AIRCRAFT WITH CAUTION AS THE CONTROL FORCES ARE REDUCED. IF PITCH AXIS IS LOST, ANY MOVEMENT OF THE THROTTLES SHOULD BE MADE SLOWLY.

▶ IF ANTI-STALL SYSTEM LTS (2) ON
ANTI-STALL SYSTEMS .... OFF .... P

AUTOSTAB .... RE-ENGAGE ONE SYSTEM ... P

▶ IF THE AUTOSTAB REMAINS DISENGAGED IN ROLL OR YAW
MAXIMUM SPEED .... M = 1.97 C

END//

IF THE AUTOSTAB REMAINS DISENGAGED IN PITCH
MAXIMUM AFT CG .... SUBSONIC 55% SUPERSONIC 58.5% .... E

AT LANDING
MINIMUM SPEED .... V_{REF} + 10 KTS. C

END//

NOTE

If PITCH OR ROLL autostabilization is lost the Emergency Flight Control function is lost.

(Unchanged)

LOSS OF CONTROL OF ONE INNER ELEVON

●▶ IF FAILURE OCCURS IN SUBSONIC FLIGHT
MAXIMUM SPEED .... M = 0.93 C

END//

●▶ IF FAILURE OCCURS BETWEEN M = 0.93 AND M = 1.7
AUTOPILOT .... DISENGAGE C

REDUCE SPEED TO 350 KT AT CONSTANT PRESSURE ALTITUDE THEN DESCENT AT 350 KT TO M = 0.93.

MAX BANK ANGLE .... 20 DEGREES C
MAXIMUM SPEED .... 350 KT C

END//

●▶ IF FAILURE OCCURS ABOVE M = 1.7
CONTINUE WITH NORMAL FLIGHT BUT AT THE DECELERATION POINT USE THE DESCENT TECHNIQUE GIVEN ABOVE.

END//

MECH JAM LIGHT ON

CONTINUE USING NORMAL PROCEDURES

CAUTION

DO NOT SELECT MECHANICAL SIGNALLING MODE.
AVOID ANY COARSE MANOEUVRE THAT COULD CAUSE A CHANNEL CHANGEOVER.

FLYING CONTROL INVERTER FAILURE

● ▶ ONE INVERTER FAILED

FAILED INVERTER .... OFF INV C

END//

● ▶ TWO INVERTERS FAILED

FAILED INVERTERS .... OFF INV C
AUTOPILOT .... DISENGAGE C

FLY THE AIRCRAFT WITH CAUTION AS THE CONTROL FORCES ARE REDUCED.
MOVE THROTTLE LEVERS SLOWLY

▶ IF FAILURE OCCURS BEFORE TRANSONIC ACCELERATION

MAXIMUM SPEED .... M = 0.93 C
MAXIMUM AFT CG .... 55% .... E

▶ IF FAILURE OCCURS AFTER TRANSONIC ACCELERATION

MAXIMUM SPEED .... M = 1.97 C
MAXIMUM AFT CG .... 58.5% .... E

AT LANDING
MINIMUM SPEED .... V_{REF} + 10 C

END//

FLYING CONTROL SIGNALLING MODE CHANGE

SIGNALLING MODE pb .... RESET .... P

IF AN ELECTRICAL SIGNALLING MODE CANNOT BE REGAINED
AUTOPILOT .... DISENGAGE ..... P

FLY THE AIRCRAFT WITH CAUTION AS THE CONTROL FORCES ARE REDUCED. IF THE INNER ELEVONS ARE IN MECHANICAL MODE MOVE THE THROTTLE LEVERS SLOWLY.

UNDER CERTAIN CONDITIONS i.e.
WITH THE RUDDER AND/OR INNER ELEVONS IN MECHANICAL MODE.
OR
IN STABILISED FLIGHT WITH THE OUTER AND MIDDLE ELEVONS IN MECHANICAL MODE.
THE AUTOPILOT MAY BE RE-ENGAGED, HOWEVER THE AUTOPILOT PERFORMANCE SHOULD BE CAREFULLY MONITORED AND IF NOT SATISFACTORY MUST BE DISENGAGED.

IF IN MECHANICAL MODE BEFORE TRANSONIC ACCELERATION
MAXIMUM SPEED .... M = 0.93 C
MAXIMUM AFT CG .... 55% .... E

IF IN MECHANICAL MODE AFTER TRANSONIC ACCELERATION
MAXIMUM SPEED .... M = 1.97 C
MAXIMUM AFT CG .... 58.5% .... E

AT LANDING
IF OUTER & MIDDLE OR INNER ELEVONS IN MECHANICAL MODE
MINIMUM SPEED .... V_{REF} + 10 KT .. C

END//

LOW HYDRAULIC PRESSURE AT FLYING CONTROLS

SERVO CONTROLS YELLOW rty sel .... OBSERVE C

IF SERVO CONTROLS YELLOW rty sel AT NORMAL

SERVO CONTROLS YELLOW rty sel ...... TOWARDS L/PRESS LT C

FLYING CONTROL SIGNALLING MODE .... CHECK. RESET IF REQ'D C

END//

CAUTION

IF AFTER SELECTION, A FALL IN THE LEVEL OF THE YELLOW TANK IS NOTED, AWAIT AUTOMATIC ISOLATION OF THE FAILED SYSTEM BY THE FIRST LEVEL WARNING ON THE YELLOW TANK. THIS PRODUCES THE SECOND LOW PRESSURE WARNING. LEAVE THE SELECTOR IN ITS EXISTING POSITION AS IN THE FOLLOWING CASE.

IF SERVO CONTROLS YELLOW rty sel AT YELLOW BLUE OR YELLOW GREEN AND ONE L/PRESS LT ON

SERVO CONTROLS YELLOW rty sel ...... LEAVE IN EXISTING POSITION C

FLYING CONTROL SIGNALLING MODE .... CHECK, RESET IF REQ'D C

END//

IF SERVO CONTROLS YELLOW rty sel AT YELLOW BLUE OR YELLOW-GREEN AND TWO L/PRESS LTS ON

SERVO CONTROLS YELLOW rty sel .... TOWARDS OTHER L/PRESS LT C

FLYING CONTROL SIGNALLING MODE .... CHECK. RESET IF REQ'D C

END//

contd.

CAUTION

WITH THE FLYING CONTROLS POWERED BY A SINGLE HYDRAULIC SYSTEM, MANOEUVRABILITY IN THE TRANSONIC REGION IS RESTRICTED.

IF FAILURE OCCURS AT LESS THAN M = 0.93
DO NOT EXCEED M = 0.93

IF FAILURE OCCURS ABOVE M = 0.93
DECELERATE TO THE AUTHORIZED SUBSONIC REGIME USING THE FOLLOWING TECHNIQUE, AVOIDING THE CG BOUNDARIES. REDUCE SPEED TO 350 KT AT CONSTANT ALTITUDE THEN DESCEND AT 350 KT UNTIL M = 0.93.

EFFECTS OF LOSS OF HYDRAULIC SYSTEMS
page 07 04.05/06.

HYDRAULIC TANK LOW LEVEL

●▶ LOW LEVEL IN YELLOW TANK ALONE

WHEN YELLOW CONTENTS LESS THAN 1 US GALL

YELLOW PUMPS sw .... MAN .... E

END//

●▶ LOW LEVEL IN BLUE OR GREEN TANK
(with or without yellow low level)

AFFECTED AIR INTAKES HYD sel .... YELLOW .... E
ALL TANK CONTENTS .... MONITOR .... E

▶ IF YELLOW LEVEL FALLS OR YELLOW L/LEVEL LT ON
MAXIMUM SPEED .... SUBSONIC C

IF INTAKE HYD LT ON OR
SPEED SUBSONIC
RAMP SPILL MASTER .... MAN .... E
APPLY PROCEDURE : INTAKE LIGHT ON

IF BLUE OR GREEN LEVEL CONTINUES TO FALL

RELAY JACK sel .... TOWARDS
SERVICEABLE
SYSTEM C

IF BLUE OR GREEN LEVEL CONTINUES TO FALL
RELAY JACK sel .... NORM C
SERVO CONTROLS YELLOW rty sel ... YELLOW BLUE OR
YELLOW GREEN C

▶ IF YELLOW LEVEL FALLS
AWAIT FLYING CONTROL SYSTEM ISOLATION
APPLY PROCEDURE : LOW HYDRAULIC PRESSURE
AT FLYING CONTROLS

IF BLUE OR GREEN LEVEL CONTINUES TO FALL
HYD PUMPS OF AFFECTED SYSTEM .... OFF .... E

END//

EFFECTS OF LOSS OF HYDRAULIC SYSTEMS
page 07.04.05/06

(Unchanged)

YELLOW HYD FLUID O/HEAT AND/OR O/PRESS

●▶ PRESSURE GREATER THAN 4500 PSI
PUMP sels (2)........................... ON .... E
YELLOW PUMPS sw .... MAN .... E
LH PUMP sel............................. AUTO ...... E

IF PRESSURE REMAINS GREATER THAN 4500 PSI
LH PUMP sel .... SHUT ...... E

IF PRESSURE REMAINS GREATER THAN 4500 PSI
LH PUMP sel .... ON .... E
RH PUMP sel .... AUTO ....E

IF PRESSURE REMAINS GREATER THAN 4500 PSI
RH PUMP sel .... SHUT ...... E

> CAUTION
>
> IF A PUMP SELECTOR HAS REMAINED AT SHUT FOR LONGER THAN 30 MINUTES - DO NOT BRING THIS PUMP BACK INTO USE.

END//

●▶ PRESSURE NORMAL (4000 PSI) OR PRESSURE GAUGE UNSERVICEABLE
YELLOW PUMPS sw .... MAN .... E
PUMP sels (2)........................... AUTO ...... E

END//

BLUE/GREEN HYD FLUID O/HEAT AND/OR O/PRESS

●▶ PRESSURE GREATER THAN 4500 PSI
LH PUMP sel .... OFF .... E

IF PRESSURE REMAINS GREATER THAN 4500 PSI
LH PUMP sel .... SHUT ...... E

IF PRESSURE REMAINS GREATER THAN 4500 PSI
LH PUMP sel .... ON .... E
RH PUMP sel .... OFF .... E

IF PRESSURE REMAINS GREATER THAN 4500 PSI
RH PUMP sel .... SHUT ...... E

> CAUTION
>
> IF A PUMP SELECTOR HAS REMAINED AT SHUT FOR LONGER THAN 30 MINUTES DO NOT BRING THIS PUMP BACK INTO USE.

END//

●▶ PRESSURE NORMAL (4000 PSI) OR PRESSURE GAUGE UNSERVICEABLE
HYD SELS FOR AFFECTED INTAKES .... YELLOW .... E
SERVO CONTROLS YELLOW rty sel .... YELLOW GREEN
OR YELLOW
BLUE C
PUMP SELS FOR AFFECTED SYSTEM .... OFF .... E

END//

EFFECTS OF LOSS OF HYDRAULIC SYSTEMS

CAUTION

AFTER LOSS OF GREEN SYSTEM:-
- WITH NOSE UP AND VISOR DOWN, LOWER NOSE BY FREE FALL SYSTEM WHEN REQUIRED.
- DURING LANDING GEAR OPERATION, USE STANDBY LOWERING SYSTEM.

AFTER LOSS OF BLUE SYSTEM AND ONE YELLOW PUMP, LOWER THE LANDING GEAR USING STANDBY SYSTEM.

AFTER LOSS OF BLUE SYSTEM WITH YELLOW 1ST LOW LEVEL WARNING, OR YELLOW 2ND LOW LEVEL CUT OFF, LOWER THE LANDING GEAR AND NOSE AND VISOR USING STANDBY SYSTEMS.

AFTER COMPLETE LOSS OF TWO SYSTEMS, LOWER LANDING GEAR AND NOSE AND VISOR BY FREE FALL.

AFTER LOSS OF BLUE SYSTEM AND TWO OTHER PUMPS (ONE GREEN AND ONE YELLOW), DO NOT USE THE EMERGENCY GENERATOR, LOWER THE LANDING GEAR USING STANDBY SYSTEM.

SYSTEM RECOVERED BY AUTOMATIC CHANGE OVER		
	Blue system lost	Green system lost
Air Intakes **	No.3 & 4 change to yellow	No.1 & 2 change to yellow
Nose wheel Steering *	-	changes to yellow

SYSTEMS RECOVERED BY MANUAL SELECTION		
Relay Jacks and Powered Flying Control units *	Blue system lost	Green system lost
	Blue side regained on Yellow-Blue selection	Green side regained on Yellow-Green selection
Normal Brakes with Anti-skid *	-	Regained on Yellow-Green selection
L/Gear, Nose and Visor lowering	-	Regained by use of standby lowering or free fall

* After auto or manual change over to yellow, the yellow supply will be isolated automatically if the 1st low level is reached on the yellow reservoir.

** If the 2nd low level is reached on the yellow reservoir, the spill door actuators are automatically isolated in Auto.

SYSTEMS LOST AND NOT RECOVERABLE		
	Blue system lost	Green system lost
Artificial feel	No.1 system lost	No.2 system lost
Tank 11 transfer pumps	Blue pump lost	Green pump lost
Emerg Generator.	-	Lost
L/Gear raise	-	Lost
L/Gear door closing on lowering	-	Lost
Nose/Visor raise	-	Lost

contd.

EFFECTS OF.LOSS OF HYDRAULIC SYSTEMS

2. Consequences of the loss of two hydraulic systems

Other System Effects	Hydraulic Systems Lost		
	Blue and Yellow	Green and Yellow	Blue and Green
Powered Flying Control Jacks	All control Jacks function on one half of the jack only	All control jacks function on one half of the jack only	All control jacks function on one half of the jack only
Relay Jacks and Autopilot	Autopilot No.1 lost. Blue side of relay lost	Autopilot No.2 lost. Green side of relay lost	Autopilot No.1 available with Yellow-Blue, selection. Autopilot No.2 available with Yellow-Green selection.
Artificial Feel	No.1 system lost	No.2 system lost	No.1 and No.2 systems lost.
Tank 11 transfer pumps	Blue pump lost	Green pump lost	Blue and Green pumps lost
L/Gear	Standby lowering lost. Normal lowering available but not to be used	Raise system lost. Standby lowering lost. Only free fall system available	Raise system lost Standby lowering available but not to be used.
Brakes	Normal braking with anti-skid available, EMERG braking limited by accumulator capacity	Normal braking with anti-skid lost, EMERG braking limited by accumulator capacity	EMERG and PARK braking available. Normal braking available on Yellow Green selection.
Nose-wheel Steering	Normal system available	Lost	Normal system available via auto change over to yellow
Nose/Visor	Standby lowering lost. Normal lowering system available but not to be used	Normal and Standby lowering lost. Free fall lowering limited to 5°	Normal lowering lost. Standby lowering system available but not to be used.
Emergency Generator	Capability for operation remains.	Lost	Lost
Air Intakes	Intakes 3 and 4 control lost (See associated drill)	Intakes 1 and 2 control lost (See associated drill)	All intakes function on Yellow system

(Unchanged)

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DISCREPANCY BETWEEN ADC 1 AND ADC2

FLY ATTITUDE

STANDBY ASI/MACHMETER	USE	CP
ADS PROBE HEATERS	VERIFY ON	E
AUTOTHROTTLE 1 & 2	DISENGAGE	C
FAULTY SYSTEM	IDENTIFY	CP

APPLY PROCEDURE : ADC FAILURE

ADC FAILURE

ASI & ALTIMETER	STANDBY MODE	CP
FAILED ADC	OFF	P
AFFECTED AUTOSTAB	OFF	P
AFFECTED ANTI-STALL SYSTEM	OFF	P
TRANSPONDER ALT RPTG	OPERATING ADC	P

▶ IF A SYMMETRIC PAIR OF ENGINES EXCEED OPERATING CRUISE RATING AT STATIC TEMPERATURES COLDER THAN −51°C

THROTTLE MASTERS	OTHER LANE	E
SECONDARY AIR DOORS	ABOVE 220 KT OPEN BELOW 220 KT SHUT	E
MAXIMUM SPEED	V_{MO} MINUS 10kt	C
	M_{MO} MINUS .05M	C

END//

CAUTION

1. DO NOT USE AUTOPILOT IN MAX SPEED MODES DUE TO A RISK OF A DRIFT IN LIMIT SPEED DATA GOING UNDETECTED.
2. DO NOT RE-ENGAGE THE ANTI-STALL SYSTEM ASSOCIATED WITH THE FAULTY ADC.
3. AFTER LOSS OF ADC 1, NO.1 AUTOSTAB SHOULD NOT BE RE-ENGAGED UNLESS NO.2 AUTOSTAB FAILS.

EFFECT OF ADC FAILURES pages 07.05.04/07.

(Comple Revised)

LOSS OF SECOND ADC

FLY ATTITUDE

STANDBY ASI/MACHMETER	USE	CP
ASI & ALTIMETERS	STANDBY MODE	CP

IF LOSS OCCURS DURING TRANSONIC ACCELERATION

TRIM TRANSFER	HOLD	E
SPEED & ALTITUDE	HOLD	C

FAILED ADCs	OFF	P
ENGINE CONTROL SCHEDULE	ABOVE 220 KT HI BELOW 220 KT LO	E
SECONDARY AIR DOORS	ABOVE 220 KT OPEN BELOW 220 KT SHUT	E
ANTI-STALL SYSTEMS	OFF	P
AUTOSTAB	RE-ENGAGE ONE SYSTEM	P
N_2, N_1 AND EGT	MANUAL CONTROL TO CRUISE RATING	E

IF SPEED ABOVE M = 1.70

MAXIMUM SPEED	V_{MO} MINUS 10 KT M_{MO} MINUS .05M	C C

IF SPEED BETWEEN M = 0.93 AND M = 1.70

SPEED	REDUCE TO M=0.93 $V \leqslant$ 380KT	C
CG	53% BELOW M=0.85 55% ABOVE M=0.85	E

IF SPEED M = 0.93 OR LESS

MAXIMUM SPEED	M=0.93/ $V \leqslant$ 380KT	C
CG	53% BELOW M=0.85 55% ABOVE M=0.85	E

AT LANDING

CG	52.5%	E
MINIMUM SPEED	V_{REF} + 10 KT	C

END//

EFFECT OF ADC FAILURES page 07.05.04/07

(Completely Revised)

EFFECTS OF SINGLE ADC FAILURE

SYSTEM	Single ADC failure or One ADC switched OFF.
Instruments	ADC 1 - Captain ADC 2 - First Officer.
ASI and Altimeter	Standby mode is available .
Machmeter Incidence Temperature VSI	On a monitor detected failure all information may not be lost. Complete loss if ADC is switched off.
Sideslip	Lost only if ADC is switched off.
INS	ADC 1 - CDU 1 and 3 wind information lost. ADC 2 - CDU 2 wind information lost.
ATC Transponder	ADC 1 -) loss of altitude signal to ADC 2 -) the selected transponder.
Anti-icing	ADC 1 - loss of normal control. ADC 2 - loss of alternative control.
Autopilot/ Flight Director	Associated A/P or F/D lost except in land mode below 1,500 ft when it remains engaged.
Autothrottle	ADC 1 - A/T 1 lost, autochange to A/T 2. ADC 2 - A/T 2 lost.
AUTOSTAB - ROLL	No disconnections - If ADC 1 lost - disengage STAB 1 to leave STAB 2 operative.
AUTOSTAB - PITCH, YAW	>270 kt - no disconnection, but if ADC 1 lost disengage No.1 system, If ADC 2 lost, take no action. <270 kt - both axes disconnect except in LAND or GLIDE mode after glide slope capture. NOTE: On ADC failure STABS revert to fixed gains/limits automatically as follows: Cruise Yaw-intermediate (M=1.4) Roll and Pitch-minimum . Approach Yaw-minimum Roll and Pitch-maximum .
ANTI-STALL	>270 kt - no failure indication but the associated ANTI-STALL system failed. <270 kt - associated ANTI-STALL system failed with SYST FAIL lt (amber) on. NOTE The failed ANTI-STALL system must be switched OFF to allow re-engagement of the AUTOSTAB if the other system is lost.

(completely revised)

contd.

EFFECTS OF DOUBLE ADC FAILURE

SYSTEM	Double ADC failure or Two ADCs switched OFF
Instruments	Captain and First Officer.
ASI & Altimeter	Standby mode is available.
Machmeter Incidence Temperature VSI	Loss of both systems .
Sideslip	Both lost if ADCs are switched off.
INS	Loss of all wind information.
ATC Transponder	Loss of altitude signals to both transponders .
Anti-icing	loss of both systems, override control available on alternate system. NOTE: ADCs OFF - T_T switch fails $>15^{\circ}$C.
Autopilot/ Flight Director	Both A/P and F/D lost except in LAND or GLIDE mode.
Autothrottle	Both A/T lost.
Autostabs	One switch of each axis may be engaged.
Anti-stall	Both ANTI-STALL systems lost. Re-engagement of AUTOSTAB is possible with associated ANTI-STALL system switched OFF.

(Completely Revised)

contd.

EFFECTS OF SINGLE ADC FAILURE

(Completely Revised)

SYSTEM	Single ADC failure or One ADC switched OFF.
ARTIFICIAL FEEL	Associated artificial feel is lost.
ELECTRIC TRIM	Associated trim is lost.
Warning System	Associated Overspeed audio, Landing Gear audio& stick shaker warnings lost. The above will be signalled from the other ADC.
Ground Proximity Warning System	ADC 1 - loss of Modes 1,2 & 3 ADC 2 - No effect.
Flight Recorder	ADC 1 - loss of altitude and speed recording. ADC 2 - loss of incidence and TOTAL temperature recording.
Flight Controls - Outer elevon lockout	No effect, both neutralisation computers automatically use the remaining ADC.
CG System	ADC 1 - Captain's CG indicator limit bugs and M/CG light lost also CG bugs on Machmeter if ADC switched off. ADC 2 - Flight Engineer's CG indicator bugs and First Officer's M/CG light lost also CG bugs on First Officer's Machmeter if ADC switched off.
Power Plant NASU	E High BCU signal Air shut-off valve M = 1.2 signal. — Auto change to other NASU. E Mid E Flyover Temp static — Signals not cross connected.
Secondary Air Doors	ADC 1 - Automatic operation of engines 1 and 4 Secondary Air Doors lost. ADC 2 - Automatic operation of engines 2 and 3 Secondary Air Doors lost.
ENG 4 T/O N_1 LIMITER	ADC 1 - 88% N_1 limit below 60 kt is not active.
Ground Idle	ADC 1 - Engine 1 and 4 LO idle lost. ADC 2 - Engine 2 and 3 LO idle lost.

EMERGENCY/ABNORMAL DRILLS
EFFECTS OF DOUBLE ADC FAILURE

SYSTEM	Double ADC failure or Two ADCs switched OFF.
Artificial Feel	Both artificial feel systems lost .
Electric Trim	Both trim systems trip except at radio altitude less than 1500 ft with LAND or GLIDE mode engaged.
Warning System	Associated audio systems lost.
GPWS	Loss of modes 1,2 & 3.
Flight Recorder	As for ADC 1 and ADC 2 .
Flight Controls-Outer elevon Lockout	System lost.
CG System	As for ADC 1 and ADC 2 .
Power Plant-NASU	E High, BCU signal and ASOV M=1.2 signal lost. Buckets go to 0°. E schedule goes to low but manual high is available. Bucket runaway protected by ASOV .
Secondary Air Doors	As for ADC 1 and ADC 2.
Eng 4 T/O N1 Limiter	As for ADC 1 .
Ground Idle	As for ADC 1 and ADC 2.

(Completely Revised)

FAILURE OF CAROUSEL INS

STANDBY HORIZON .... USE C
FAILED INS .... IDENTIFY .... CP

IF INS 1 OR INS 2 FAILED
ATT INS sw .... ATT INS 3 .... CP

CLEAR ANY REMAINING FLAGS BY
APPROPRIATE SWITCH ACTION

CDU DATA sel .... DSRTK/STS ....
TEST pb .... PRESS AND
RELEASE ....

IF ACTION CODE RETURNS
01 CODE .... OFF .... E
02 CODE) .... ATT .... E
03 CODE) .... ATT IF NAV DATA DEGRADES. E
04 CODE .... GROUND OPERATION ONLY ....
05 CODE........................... CHECK MAL CODE .. CP

IF MAL CODE 55
NAV AID DATA .... RELOAD .... CP

06 CODE .... CHECK MAL CODE .. CP

IF MAL CODE 41 OR 43
PRESENT POSITION .... RELOAD .... CP

IF MAL CODE 49
MANUAL UPDATE .... CHECK AND FLUSH
IF NECESSARY .... CP

END//

IF ACTION CODE DOES NOT RETURN
FLIGHT SYSTEM SWITCHES .... NORMAL .... CP

END//

NOTE

1. When an INS is set to ATT the Flight Director, Autopilot (except in INS and TRK modes) and Autothrottle may be used providing the associated compass coupler is supplied in INS 3 with INS 3 in NAV mode.

2.

If INS 1 switched OFF	AP/FD 1, AT 1 and weather radar No.1 stabilisation are lost.
If INS 2 switched OFF	AP/FD 2, AT 2 and weather radar No.2 stabilisation are lost.

(Unchanged)

FAILURE OF FOUR MAIN GENERATORS

EMERG GEN	MANUAL	E
ENGINE FEED PUMPS	ALL ON	E
ENGINE RECIRCULATION VALVES	ALL SHUT	E
SERVO CONTROLS YELLOW rty sel	YELLOW GREEN	C
REAR EXTRACT STANDBY FAN	ON	E

F/O ASI AND ALTIMETER	STANDBY MODE	P
ADC 2	OFF	P
AC ESS BUS sws	ALL EMERG	E
AIR INTAKES LANE rty sel	1 & 3 TO A 2 & 4 TO B	E
AIR INTAKES HYD sel	1 TO GREEN 3 TO BLUE 2 & 4 TO YELLOW	E
ENGINE CONTROL SCHEDULE	ABOVE 220 KT HI	E
	BELOW 220 KT LO	E
BATTERY sels (2)	ESS MAIN SPLIT	E
THROTTLE MASTER sels	MAIN	E
WING & INTAKE ANTI-ICING	OFF	E
GALLEYS	SHED	E
GENERATORS	RECOVER	E

IF GENERATOR (S) RECOVERED
APPLY APPROPRIATE PROCEDURES

IF ONLY ONE GENERATOR IS RECOVERED
REVIEW THE DRILL:' FAILURE OF THREE MAIN GENERATORS

and apply as necessary

IF ALL GENERATORS REMAIN OFFLINE

No 3 INS MODE	ATT	E
W/SHIELD DE-ICE L sel	LOW	P
No 1 & 2 ANTI STALL	OFF	P
AUTOSTAB No.1	ENGAGE	P
ARTIFICIAL FEEL No.1	ENGAGE	P
F/O INSTRUMENT TRANSFER sws	ALL LEFT	P

PLAN TO LAND AT NEAREST SUITABLE AIRFIELD.

contd.

FAILURE OF FOUR MAIN GENERATORS (continued)

SPEED .... REDUCE TO SUBSONIC C

CAUTION
THE ENGINE RECIRCULATION VALVES MUST NOT BE OPENED UNLESS MAIN GENERATION IS RESTORED.

IF TANKS 6 AND/OR 8 CONTAIN MORE THAN 1000 KG
INTER-CON VALVES (5-8)
AND/OR (6-7) .... OPEN .... E

IF FUEL IN TANK 11
TANK 11 PUMPS BLUE AND GREEN .... ON .... E

IF FUEL REQUIRED IN TANK 9

CAUTION
ONCE FUEL IS IN TANK 9 THE ONLY METHOD OF TRANSFER OUT IS GRAVITY FEED

TANK 9 INLET VALVE O/RIDE sels ... OPEN .... E

WHEN TANK 9 FUEL AS REQUIRED.
TANK 9 INLET VALVE O/RIDE sels ... SHUT .... E

TANK 5 & 7 INLET VALVE O/RIDE sels...OPEN .... E

IF FUEL IN TANKS 5 & 7
CROSSFEED rty sels .... ALL INLINE ..... E
TANK 5 & 7 PUMPS sels .... EMERG .... E

PRIOR TO APPROACH CHECKLIST
TANK 5 & 7 PUMPS sels .... OFF .... E

LOWER VISOR/NOSE USING STANDBY LOWERING
AT SPEED FOR NOSE DOWN

LOWER LANDING GEAR USING STANDBY LOWERING
SET BRAKES TO EMERG BEFORE LANDING

END//

contd.

FAILURE OF FOUR MAIN GENERATORS (continued)

NOTE

ON EMERGENCY ELECTRICS

The following are AVAILABLE

- Normal pressurisation control
- Fuel TOTAL CONTENTS indications and FQIs
- FASTEN SEAT BELTS and NO SMOKING signs
- Standby horizon
- Captain's ADF/RMI
- First Officer's VOR/RMI
- Voice recorder
- Public address
- TRK/HDG unit
- Marker
- Interphone audio selector panels (4)
- No.1 ADC, INS, ADI, Compass Coupler and HSI
- No.1 ADF, VOR, DME, ILS and Radio Altimeter
- No.1 ATC Transponder, VHF and HF

The engine operating schedule will be MID with HI selected and gear up:
it will be LO with any other selection

The following are NOT AVAILABLE

- Autopilot
- Autothrottle
- Normal landing gear operation
- Normal visor/nose operation
- Visor/nose position indicator
- Reverse thrust
- Nosewheel steering
- Landing lights
- Reheat
- Normal brakes

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FAILURE OF THREE MAIN GENERATORS

WING & INTAKE ANTI-ICING .... OFF .... E
GALLEYS .... SHED .... E
EMERG GEN .... MANUAL
CHECK VOLTS
& FREQUENCY .. E

— — — — — — — — —

F/O ASI AND ALTIMETER .... STANDBY MODE . P
F/O INSTRUMENT TRANSFER sws .... ALL LEFT ..... P
ADC 2 .... OFF .... P
SERVO CONTROLS YELLOW rty sel .... YELLOW GREEN . C
AC ESS BUS sws .... ALL EMERG .... E
No 1 & 2 ANTI STALL .... OFF .... P
AUTOSTAB No.1 .... ENGAGE .... P
ARTIFICIAL FEEL No.1 .... ENGAGE .... P
RADAR .... SYSTEM 2 ..... P
GENERATORS .... RECOVER ...... E

IF THREE GENERATORS REMAIN OFFLINE
KW/KVAR .... MONITOR ...... E

END//

NOTE:
WING & INTAKE ANTI-ICING may be used if necessary but should be kept to a minimum.

The following major services are NOT AVAILABLE with

No.2 AC ESS BUS switch at EMERG	No.3 AC ESS BUS switch at EMERG
No.1 - AFCS	No.2 - AFCS
- Autothrottle	- Autothrottle
- Electric Trim	- Electric Trim
- Safety Flight Control	- Autostabs
- Radar	- Artificial Feel
Blue & Green Hydraulic contents gauges	- Safety Flight Control
Nosewheel Steering	- ADC, ADI & HSI
No.2 Compass standby supply	- ILS, VOR, DME & ADF
	- Captains VOR/RMI
	- Co-pilots ADF/RMI
	- Radio Altimeter
	Yellow Hydraulic contents gauge
	No.2 compass normal supply

NOTE

No.2 compass will only be inoperative if both No.2 and No.3 switches are at EMERG.

AC MAIN BUS LIGHT ON

ENGINE FEED PUMPS .... ALL ON .... E
BTB sel .... TRIP .... E
GENERATOR .... TEST
CHECK VOLTS
& FREQUENCY ... E

IF VOLTS AND/OR FREQUENCY ARE ABNORMAL
GENERATOR .... OFF .... E
SSB sw .... OPEN .... E
BTB sel .... RESET .... E

IF AC MAIN BUS LT ON, BTB MI CROSSLINE
BTB sel .... TRIP .... E
SSB sw .... CLOSE .... E

IF NO.3 AC MAIN BUS LT ON
AIR INTAKE LANE rty sels .... 2 TO B
3 TO A .... E

IF NO.4 AC MAIN BUS LT ON
AIR INTAKE LANE rty sels .... 1 TO A
4 TO B .... E

END//

IF AC MAIN BUS LT OFF, BTB MI INLINE
SSB sw .... CLOSE .... E
EMERG GEN NORM/ISOL sw .... ISOL THEN NORM. E
ENGINE FEED PUMPS .... AS REQUIRED ... E

END//

contd.

(Unchanged)

AC MAIN BUS LIGHT ON (continued)

- IF VOLTS AND FREQUENCY ARE NORMAL
  - GENERATOR .... ON .... E
  - IF AC MAIN BUS LT ON
    - GENERATOR .... OFF .... E
    - SSB sw .... OPEN .... E
    - BTB sel .... RESET .... E
    - IF AC MAIN BUS LT ON, BTB MI CROSSLINE
      - BTB sel .... TRIP .... E
      - SSB sw .... CLOSE .... E
      - IF NO.3 AC MAIN BUS LT ON
        - AIR INTAKE LANE rty sels .... 2 TO B
        - 3 TO A .... E
      - IF NO.4 AC MAIN BUS LT ON
        - AIR INTAKE LANE rty sels .... 1 TO A
        - 4 TO B .... E
      - END//
    - IF AC MAIN BUS LT OFF, BTB MI INLINE
      - SSB sw .... CLOSE .... E
      - EMERG GEN NORM/ISOL sw .... ISOL THEN NORM..E
      - ENGINE FEED PUMPS .... AS REQUIRED ... E
    - END//
- IF AC MAIN BUS LT OFF, GCB MI INLINE
  - EMERG GEN NORM/ISOL sw .... ISOL THEN NORM..E
  - ENGINE FEED PUMPS .... AS REQUIRED ... E

END//

CAUTION

WHEN GENERATOR SUPPLY HAS BEEN RECOVERED AFTER AN AC MAIN BUS FAILURE THE BTB SHOULD NOT BE RESET

CAUTION

WHEN BUSBAR SUPPLY HAS BEEN RECOVERED BY BTB SWITCH ACTION THE ASSOCIATED GENERATOR MUST NOT BE RESELECTED

(Unchanged)

AC ESS BUS LIGHT ON

AC ESS BUS sw .... EMERG .... E

▶ IF No 3 ESS BUS SW AT EMERG
ADC 2 .... OFF .... P

IF AC ESS BUS LT REMAINS ON
EMERG GEN .... MANUAL .... E

END//

The following major services are NOT AVAILABLE with

No.2 AC ESS BUS switch at EMERG	No.3 AC ESS BUS switch at EMERG
No.1 - AFCS - Autothrottle - Electric Trim - Safety Flight Control - Radar Blue & green Hydraulic contents gauges Nosewheel steering No.2 Compass standby supply	No.2 - AFCS - Autothrottle - Electric Trim - Autostabs - Artificial Feel - Safety Flight Control - ADC, ADI & HSI - ILS, VOR, DME & ADF - Captains VOR/RMI - Co-pilots ADF/RMI - Radio Altimeter Yellow Hydraulic Contents gauge No.2 compass normal supply

NOTE

No.2 compass will only be inoperative if both No.2 and No.3 switches are at EMERG.

EMERG GEN O/HEAT LIGHT ON

EMERG GEN
NORM/ISOL sw .... ISOL .... E

END//

EMERG GEN FAIL LIGHT ON

FAIL LT .... PRESS AND RELEASE .... E

IF FAIL LT REMAINS ON
EMERG GEN .... CHECK VOLTS & FREQUENCY .... E

IF OFF SCALE OR ZERO
EMERG GEN
NORM/ISOL sw .... ISOL .... E

SYSTEMS POWERED BY THE
AFFECTED AC ESSENTIAL BUSBARS .... MONITOR .... E

END//

FAILURE OF ONE OR TWO GENERATORS

GENERATOR .... TEST
CHECK VOLTS & FREQUENCY .... E

IF VOLTS AND FREQUENCY ARE ABNORMAL
GENERATOR .... OFF .... E

IF KW INDICATIONS ON REMAINING GENERATORS ARE ABOVE LIMITS
ELECTRICAL LOADS .... REDUCE .... E

END//

IF VOLTS AND FREQUENCY ARE NORMAL
GENERATOR .... ON .... E

END//

NOTE

If two main generators are off-line and WING & INTAKE ANTI-ICING is selected, monitor loads and shed galley if necessary.

DC ESS BUS LIGHT ON

BATTERY sel .... BATT ON .... E

IF BATTERY AMMETER OFF SCALE
BATTERY sel .... BATT OFF ...... E

TRU sws .... ALL NORM ...... E
DC VOLTS sel .... AFFECTED
BUSBAR .... E

IF ESS B VOLTAGE NOT ACCEPTABLE
EMERG GEN .... MANUAL .... E

END//

DC MAIN BUS LIGHT ON

IF ESSENTIAL MAIN SPLIT MIS NOT INLINE
BATTERY sels (2) .... BATT ON .... E

DC VOLTS sel .... MAIN A .... E

IF VOLTMETER READING IS 0
NO 2 TRU sw .... NORM .... E

REPEAT OPERATION FOR MAIN B (No 3 TRU) .... E

END//

CSD LIGHT ON

CSD .... DISC .... E
GENERATOR .... OFF .... E

IF KW INDICATIONS ON REMAINING GENERATORS ARE ABOVE LIMITS
ELECTRICAL LOADS .... REDUCE .... E

END//

CSD OIL INLET TEMP LIGHT ON

CSD OIL INLET TEMPERATURE .... MONITOR .... E

IF CSD OIL INLET TEMPERATURE EXCEEDS 155°C
ENGINE FUEL TEMPERATURE
(SECONDARY INSTRUMENTS PANEL) .... OBSERVE .... E

IF ENGINE FUEL TEMPERATURE ABOVE 70°C
FUEL HEATER .... OFF .... E

ELECTRICAL LOADS .... REDUCE IF
PRACTICABLE .... E

IF CSD OIL INLET TEMPERATURE REMAINS ABOVE 155°C FOR 5 MINS

CSD .... DISC .... E
GENERATOR .... OFF .... E

END//

CSD HIGH DIFFERENTIAL TEMPERATURE

IF THE CSD OIL DIFF TEMPERATURE EXCEEDS:-
20°C FOR ELECTRICAL LOADS UP TO 30 KW
OR
30°C FOR ELECTRICAL LOADS ABOVE 30 KW

GENERATOR .... OFF .... E

IF CSD OIL DIFF TEMPERATURE REMAINS ABOVE 20°C
CSD .... DISC .... E

END//

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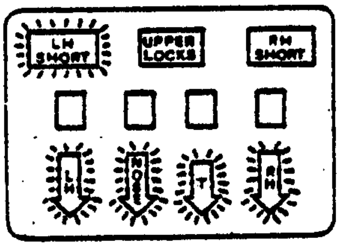
LANDING WITH ABNORMAL LANDING GEAR CONFIGURATION

● ONE MAIN LANDING GEAR LOCKED DOWN BUT EXTENSION ABNORMAL



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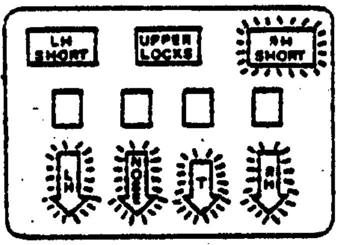


CAUTION

DO NOT ATTEMPT TO CORRECT THIS CONDITION BY APPLICATION OF THE LANDING GEAR STANDBY LOWERING OR MAIN GEAR-FREE FALL PROCEDURES.

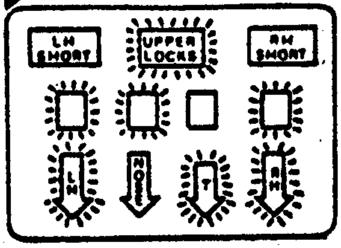
HANDLING

The approach and landing should be normal keeping as much weight as possible off the shortened leg.

END//

NOSE LANDING GEAR NOT LOCKED DOWN .07.02
ONE MAIN LANDING GEAR DOWN BUT NOT LOCKED (the other leg locked down) .07.04
ONE MAIN LANDING GEAR NOT FULLY LOWERED OR REMAINS LOCKED UP .07.06
MAIN AND NOSE LANDING GEAR UNLOCKED IN DOWN POSITION .07.09

●▶ NOSE LANDING GEAR NOT LOCKED DOWN



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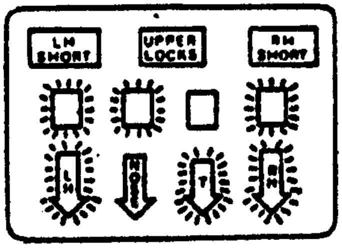


THIS DRILL IS TO BE USED ONLY AFTER USE OF THE LANDING GEAR STANDBY LOWERING AND RELEVANT FREE FALL DRILLS HAVE BEEN UNSUCCESSFUL.

REVIEW THE DRILL : PASSENGER EVACUATION
ON LANDING

JETTISON AS MUCH FUEL AS POSSIBLE

GPW C/B .... TRIP .... E
L/GEAR WARN C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
GRND PROXIMITY WARN AC SUP	13-215	G4
AUDIO WARN SYS SUP 1	1-213	M21

AT 180 KTS
AUDIO .... CANCEL .... E

NOTE

With the GPW circuit breaker tripped all modes of operation will be inhibited.

With the L/GEAR WARN circuit breaker tripped the audio will operate at 180 knots.

contd.

(Unchanged)

LANDING CHECKLIST

JETTISON	TERMINATED	E
DRAIN MAST HTRS	OFF	E
L/GEAR NORMAL LEVER	DOWN	P
STANDBY LOWERING LEVER	WHEELS	E
CG	53%	E
NOSE	DOWN, GREEN	E.P
VISOR NOSE STBY CONTROL	VISOR DOWN	E
BRAKES LEVER	EMERG	P
SECONDARY AIR DOORS	SHUT	E
RADAR	STANDBY	E
YELLOW PUMPS	ON/PRESSURE NORMAL	E
AUX INLET MIs	OPEN/CROSS-HATCHED	E
SEAT	LOCKED/PWR OFF	E
LANDING CHECKLIST	COMPLETED	E

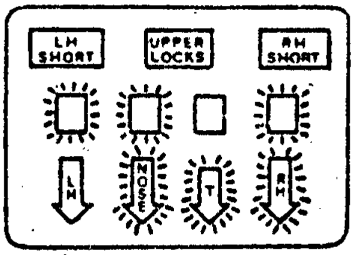
HANDLING

Following a normal approach and flare reverse idle should be selected at touchdown.
The nose up attitude at touchdown should be maintained and normal reverse selected as soon as possible, bearing in mind the aircrafts tendency to pitch up with increasing reverse thrust.
Braking should be gentle and cease at 120 knots. At 110 knots the attitude should be reduced to touchdown on the nosewheel as gently as possible. At approximately 85 knots: Reverse idle should then be reselected.

AT REST
IF NECESSARY APPLY PROCEDURE: PASSENGER EVACUATION ON LANDING

(Deletion)

● ▶ ONE MAIN LANDING GEAR DOWN BUT NOT LOCKED (the other leg locked down)



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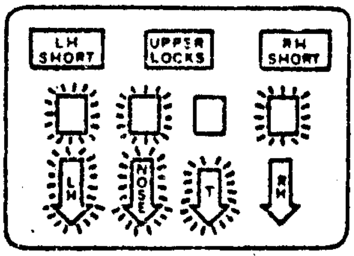

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REVIEW THE DRILL : PASSENGER EVACUATION ON LANDING

JETTISON AS MUCH FUEL AS POSSIBLE ON THE SIDE NOT LOCKED DOWN

GPW C/B .... TRIP .... E
L/GEAR WARN C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
GRND PROXIMITY WARN AC SUP	13-215	G4
AUDIO WARN SYS SUP 1	1-213	M21

AT 180 KTS
AUDIO .... CANCEL .... E

NOTE

With the GPW circuit breaker tripped all modes of operation will be inhibited.

With the L/GEAR WARN circuit breaker tripped the audio will operate at 180 knots.

contd.

(Unchanged)

LANDING CHECKLIST

JETTISON	TERMINATED	E
DRAIN MAST HTRS	OFF	E
L/GEAR NORMAL LEVER	DOWN	P
STANDBY LOWERING LEVER	WHEELS	E
NOSE	DOWN, GREEN	E.P
BRAKES	CHECKED/NORM	P
SECONDARY AIR DOORS	SHUT	E
RADAR	STANDBY	E
YELLOW PUMPS	ON/PRESSURE NORMAL	E
AUX INLET MIs	OPEN/CROSS HATCHED	E
SEAT	LOCKED/PWR OFF	E
LANDING CHECKLIST	COMPLETED	E

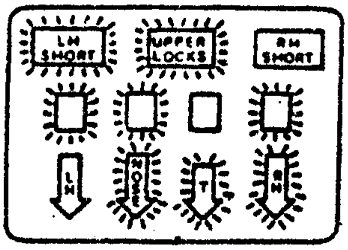
HANDLING

The approach and landing should be normal with slight side slip towards the side with the leg locked down.

AT TOUCHDOWN
IF NECESSARY SHUT DOWN ENGINE(S) USING THE ENGINE SHUT DOWN HANDLES. WAIT SEVEN SECONDS THEN PRESS 2 SHOT EXTINGUISHER.

AT REST
IF NECESSARY APPLY PROCEDURE: PASSENGER EVACUATION ON LANDING

● ▶ ONE MAIN LANDING GEAR NOT FULLY LOWERED OR REMAINS LOCKED UP



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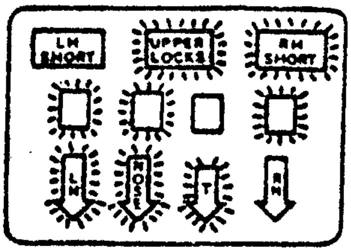

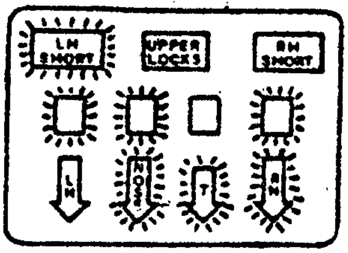

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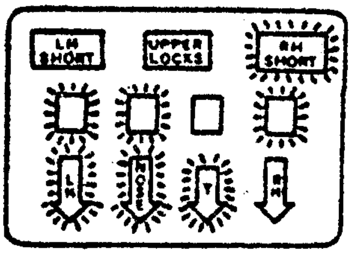

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REVIEW THE DRILL : PASSENGER EVACUATION
ON LANDING

GPW C/B .... TRIP ....E
L/GEAR WARN C/B .... TRIP ....E

CIRCUIT BREAKER	PANEL	GRID REF
GRND PROXIMITY WARN AC SUP	13-215	G4
AUDIO WARN SYS SUP 1	1-213	M21

AT 180 KTS
AUDIO .... CANCEL ....E

NOTE

With the GPW circuit breaker tripped all modes of operation will be inhibited.

With the L/GEAR WARN circuit breaker tripped the audio will operate at 180 knots.

contd.

⇩

ATTEMPT TO RETRACT THE LANDING GEAR AND THEN TO LOWER THE NOSE GEAR AS FOLLOWS

L/GEAR NORMAL LEVER .... NEUTRAL .... P
STANDBY LOWERING LEVER .... NEUTRAL .... E
MAIN GEAR .... FREE FALL .... E
FREE FALL CONTROLS .... NORMAL/PNEUMATICS DISCONNECTED .... E
YELLOW PUMPS .... ON .... E
STANBY LOWERING LEVER .... DOORS .... E
L/GEAR NORMAL LEVER .... UP .... E
STANDBY LOWERING LEVER .... WHEELS THEN DOORS ...... E

WAIT 10 SECONDS
L/GEAR RAISE C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
L/GEAR RAISE	15-215	A6

STANDBY LOWERING LEVER .... NEUTRAL .... E

WAIT 30 SECONDS
L/GEAR RAISE C/B .... RESET .... E

JETTISON AS MUCH FUEL AS POSSIBLE

L/GEAR NORMAL LEVER .... NEUTRAL.......... E

NOSE GEAR .... FREE FALL .... E

DO NOT PUT L/GEAR NORMAL LEVER TO DOWN

EMERGENCY RELEASE OPERATION

1. PULL OUT PIN
2. LOCATE HAND WHEEL
3. TURN HAND WHEEL FULLY CLOCKWISE
4. CHECK DOWN LOCK VISUAL INDICATION

UNLOCKED	LOCKED
○ RED	○ RED ▭ WHITE

L/GEAR NORMAL LEVER .... UP .... E

contd.

LANDING CHECKLIST

JETTISON	TERMINATED	E
DRAIN MAST HTRS	OFF	E
NOSE	DOWN, GREEN	E.P
SECONDARY AIR DOORS sels	SHUT	E
RADAR	STANDBY	E
AUX INLET MIs	OPEN/CROSS HATCHED	E
SEAT	LOCKED/PWR OFF	E
LANDING CHECKLIST	COMPLETED	E

HANDLING

Following a normal approach and flare touch down as gently as possible on the nosewheels and nacelles.

AT TOUCHDOWN
ENGINE SHUTDOWN HANDLES .... PULL .... E

SEVEN SECONDS AFTER PULLING HANDLES
2 SHOT .... PRESS .... E

AT REST
APPLY PROCEDURE : PASSENGER EVACUATION ON LANDING

EMERG GEN O/HEAT LIGHT ON

EMERG GEN
NORM/ISOL sw .... ISOL .... E

END//

EMERG GEN FAIL LIGHT ON

FAIL LT .... PRESS AND
RELEASE .... E

IF FAIL LT REMAINS ON
EMERG GEN .... CHECK VOLTS
& FREQUENCY .... E

IF OFF SCALE OR ZERO
EMERG GEN
NORM/ISOL sw .... ISOL .... E

SYSTEMS POWERED BY THE
AFFECTED AC ESSENTIAL BUSBARS .... MONITOR .... E

END//

FAILURE OF ONE OR TWO GENERATORS

GENERATOR .... TEST
CHECK VOLTS
& FREQUENCY .... E

IF VOLTS AND FREQUENCY ARE ABNORMAL
GENERATOR .... OFF .... E

IF KW INDICATIONS ON REMAINING GENERATORS
ARE ABOVE LIMITS
ELECTRICAL LOADS .... REDUCE .... E

END//

IF VOLTS AND FREQUENCY ARE NORMAL
GENERATOR .... ON .... E

END//

NOTE

If two main generators are off-line and WING & INTAKE ANTI-ICING is selected, monitor loads and shed galley if necessary.

DC ESS BUS LIGHT ON

BATTERY sel .... BATT ON .... E

▶ IF BATTERY AMMETER OFF SCALE
BATTERY sel .... BATT OFF ...... E

TRU sws .... ALL NORM ...... E
DC VOLTS sel .... AFFECTED BUSBAR .... E

IF ESS B VOLTAGE NOT ACCEPTABLE
EMERG GEN .... MANUAL .... E

END//

DC MAIN BUS LIGHT ON

▶ IF ESSENTIAL MAIN SPLIT MIS NOT INLINE
BATTERY sels (2) .... BATT ON .... E

DC VOLTS sel .... MAIN A .... E

▶ IF VOLTMETER READING IS 0
NO 2 TRU sw .... NORM .... E

REPEAT OPERATION FOR MAIN B (No 3 TRU) .... E

END//

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LANDING GEAR STANDBY LOWERING

L/GEAR NORMAL LEVER	NEUTRAL	P
YELLOW HYD PUMPS	ON	E
STANDBY LOWERING LEVER	DOOR FOR 4 SEC THEN WHEELS	E
L/GEAR NORMAL LEVER	DOWN	P
ENGINES	SHUT DOWN NO.4 LAST	E

NOTE

The landing gear doors remain open
Avoid large side slip angles

(Unchanged)

MAIN GEAR – FREE FALL

L/GEAR NORMAL LEVER .... NEUTRAL .... P
STANDBY LOWERING LEVER .... NEUTRAL .... E

AT EMERGENCY CONTROL POSITION

EMERGENCY RELEASE OPERATION

1-MOVE OPEN INDEX ON KNURLED KNOB TO RED LINE
2-REMOVE PIN FROM BELLCRANK
3-OPERATE BELLCRANK TO RIGHT HAND BY USE OF CONTROL LEVER
4-CHECK DOWNLOCK VISUAL INDICATION

UNLOCKED	LOCKED
○ RED	○ RED ▭ WHITE

5-IF DOWNLOCK IS NOT OBTAINED USE PNEUMATIC AID (LOCATED BETWEEN TWO CENTRE CROSSBEAMS)

(AFTER USE OF PNEUMATIC SYSTEM CLOSE COCK REMOVE AIR LINE)

L/GEAR NORMAL LEVER .... DOWN .... P

END//

NOTE

The landing gear doors remain open.
Avoid large side slip angles.
If the green hydraulic system is not pressurised the tail wheel will not lower.

The above procedure takes approx. 3½ minutes.

NOSE GEAR — FREE FALL

L/GEAR NORMAL LEVER .... NEUTRAL .... P
STANDBY LOWERING LEVER .... NEUTRAL .... E

AT EMERGENCY CONTROL POSITION

EMERGENCY RELEASE OPERATION

1. PULL OUT PIN
2. LOCATE HAND WHEEL
3. TURN HAND WHEEL FULLY CLOCKWISE
4. CHECK DOWN LOCK VISUAL INDICATION

UNLOCKED	LOCKED
○ RED	○ RED ▭ WHITE

L/GEAR NORMAL LEVER .... DOWN .... P

END//

NOTE
The landing gear doors remain open.
Avoid large side slip angles.

WHEELS O/HEAT LIGHT ON IN FLIGHT

● ▶ WITH LANDING GEAR UP

VISOR .... DOWN .... P
LANDING GEAR .... DOWN .... P
BRAKE FANS .... CONFIRM ON .... E

WHEN BRAKES TEMP LESS THAN 150°C
LANDING GEAR .... UP: LTS OFF: NEUTRAL.... PE
BRAKE FANS .... OFF .... E
ENG RATING MODE .... FLIGHT .... E

END//

● ▶ WITH LANDING GEAR DOWN

PROVIDING SAFETY CONSIDERATIONS PERMIT LEAVE LANDING GEAR DOWN UNTIL BRAKES TEMP LESS THAN 150°C

BRAKE FANS .... CONFIRM ON .... E

END//

(Deletion)

USE OF BRAKES IN EMERG

THIS DRILL IS USED IF THE BRAKES FAIL LIGHT IS ON OR IF FOUR OR MORE R LIGHTS ARE OFF IN THE LANDING CHECKS.

BRAKES PEDALS .... RELEASE C

BRAKES LEVER .... EMERG C

ANTI-SKID IS NOT AVAILABLE. USE THE BRAKES WITH CARE, APPLYING PRESSURE GENTLY AND MONITORING THE PRESSURE WITH REFERENCE TO THE BRAKES PRESSURE GAUGE.

ON A WET RUNWAY THE BRAKES MUST BE RELEASED EVERY 5 SECONDS AND THE FOLLOWING MAXIMUM PRESSURES MUST NOT BE EXCEEDED.

450 PSI AT SPEEDS ABOVE 75 KNOTS
900 PSI AT SPEEDS BELOW 75 KNOTS

ON A DRY RUNWAY CONTINUOUS BRAKING TO A MAXIMUM OF 1100 PSI IS PERMITTED.

IF AIRCRAFT IS NOT BRAKED

BRAKES LEVER .... PARK .... P

CAUTION

PARK SHOULD ONLY BE USED WHEN ABSOLUTELY NECESSARY. NO MODULATION OF THE BRAKE PRESSURE IS AVAILABLE, BECAUSE AT PARK POSITION ALL AVAILABLE BRAKE ACCUMULATOR PRESSURE IS DELIVERED TO THE BRAKES.

END//

(Un ged)

VISOR/NOSE UNLOCK LIGHT ON

●▶ WITH THE VISOR/NOSE UP

SPEED .... REDUCE TO LESSER OF 325 KT/M = 0.95 C

END//

●▶ WITH NOSE AT 5° OR DOWN AND NOSE MI READING UP

BEFORE LANDING

GPW C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
GRND PROXIMITY WARN AC SUP	13-215	G4

AT LANDING

CG .... 52.5% .... E

MINIMUM SPEED .... V_{REF} + 10 KTS C

NOTE

With nose at 5°, the indicated incidence will be approx. 4° low. With nose at DOWN, the indicated incidence will be approx. 11° low.

END//

●▶ **IF 5°L LT ON**

APPLY PROCEDURE
NOSE 5°L LIGHT ON

NOSE 5° L LIGHT ON

CAUTION

WITH UNSAFE 5° LOCKS THE NOSE MAY, DURING THE LOWERING SEQUENCE, PASS THE 5° POSITION TOWARD THE DOWN POSITION. THEREFORE BEFORE SELECTING 5° REDUCE SPEED TO 270 KTS AND ALTITUDE BELOW 20,000 FT.

●▶ WITH THE NOSE UP

CONTINUE WITH NORMAL FLIGHT.
OBSERVE CAUTION BEFORE LOWERING NOSE

END//

●▶ WITH NOSE AT 5°

NOSE .... SELECT UP .... P
OBSERVE CAUTION BEFORE LOWERING NOSE

END//

VISOR/NOSE STANDBY LOWERING (VISOR UP TO NOSE 5°)

●▶ IF GREEN TANK LEVEL HAS FALLEN SINCE FIRST ATTEMPT TO LOWER VISOR
APPLY PROCEDURE: VISOR NOSE FREE FALL

●▶ IF GREEN TANK LEVEL HAS NOT FALLEN SINCE FIRST ATTEMPT TO LOWER VISOR
STBY CONTROL sw ....VISOR LOWER ..... P

▶ IF 5°L LT ON
SPEED ....REDUCE TO 270 KT C
ALTITUDE ....BELOW 20000 FT .. C

STBY CONTROL sw ....NOSE 5° .... P

▶ IF NOSE WILL NOT LOWER TO 5°
APPLY PROCEDURE: VISOR/NOSE FREE FALL

▼ IF NOSE LOWERS TO 5°

WHEN REQUIRED

APPLY PROCEDURE: NOSE STANDBY LOWERING
5° TO DOWN

(Unchanged)

NOSE STANDBY LOWERING (5° TO DOWN)

● ▶ IF GREEN TANK LEVEL HAS FALLEN SINCE FIRST ATTEMPT TO LOWER VISOR
PREPARE TO LAND WITH NOSE AT 5° AND
EXISTING VISOR POSITION C
GPW C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
GRND PROXIMITY WARN AC SUP	13-215	G4

END//

● ▶ IF GREEN TANK LEVEL HAS NOT FALLEN SINCE FIRST ATTEMPT TO LOWER VISOR
STBY CONTROL sw .... NOSE DOWN ..... P

IF NOSE WILL NOT LOWER TO DOWN
PREPARE TO LAND AS PRESENTLY CONFIGURED C
GPW C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
GRND PROXIMITY WARN AC SUP	13-215	G4

END//

NOTE

With the GPW circuit breaker tripped all modes of the ground proximity warning system are inhibited

VISOR/NOSE FREE FALL

GPW C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
GRND PROXIMITY WARN AC SUP	13-215	G4

▶ IF 5°L LT ON

SPEED .... REDUCE TO
270 KT C

ALTITUDE .... BELOW 20000 FT C

EMERGENCY NOSE/VISOR
UPLOCK RELEASE .... OPERATE FULLY
TO ENGAGE
LATCH .... P

PREPARE TO LAND AS PRESENTLY CONFIGURED C

END//

NOTE

With the GPW circuit breaker tripped all modes of the ground proximity warning system are inhibited.

RAPID DEPRESSURIZATION

AUDIO	CANCEL	E
OXYGEN	ON 100%	ALL
CREW COMMUNICATION	ESTABLISH	ALL
CABIN ALTITUDE	CONFIRM WARNING	E
PASSENGER OXYGEN	CONFIRM ON	E
DISCHARGE VALVES	IF OPEN SELECT THE OTHER SYSTEM AND CLOSE MANUALLY IF NECESSARY	E
GROUND PRESSURE RELIEF VALVE	SHUT	E

IF CABIN ALTITUDE CANNOT BE CONTROLLED
APPLY PROCEDURE: EMERGENCY DESCENT

EMERGENCY DESCENT

THROTTLES	IDLE	C
FUEL FWD TRANS sw	O/RIDE	C
TANK 9 & 10 PUMP sels	VERIFY OFF	E
PRESSURIZATION	MAX RATE OF DESCENT	E
CABIN ALTITUDE sel	ZERO	E
ATC TRANSPONDER	A7700	C
SAFETY HEIGHT	CHECK	P

— — — — — — — — —

TANK 9 INLET VALVES MAIN sel	AUTO	E
TANK 11 PUMPS	ALL AUTO	E
TANKS 9 & 10 LLC	8000 KG	E
TANK 11 LLC	ZERO	E
TRIM TRANS AUTO MASTER sel	FORWARD	E
FUEL FWD TRANS sw	GUARD	C
FWD EMERGY RELIEF sw	OPEN	E
FWD EXTRACT FANS	ALL ON	E

IF OXYGEN HAS BEEN IN USE
WHEN CABIN ALTITUDE DESCENDS TO 15000 FT OR BELOW

NO SMOKING SIGNS	ON	E
CREW OXYGEN	SELECT N USE AS REQD	ALL

PASSENGER OXYGEN SHOULD RETURN TO NORMAL FLOW AUTOMATICALLY BUT IF MANUAL OVERRIDES HAVE BEEN USED THEY SHOULD BE RESET.

IF NORMAL CABIN PRESSURE CANNOT BE RESTORED

CABIN & FLIGHT DECK TEMPERATURE SELECTORS	COOLEST AUTO SETTING	E

END//

(Deleti

SHUT DOWN OF AIR CONDITIONING GROUPS

BLEED VALVE .... SHUT .... E
COND VALVE .... OFF .... E
ASSOCIATED GROUP sw .... FAILED .... E
COND VALVES FOR OTHER GROUPS .... BOOST .... E

AFTER SHUT DOWN OF A SECOND GROUP

DISCHARGE VALVE sw FOR SYSTEM IN USE .... AFT SHUT .... E
FWD EMERGY RELIEF sw .... OPEN .... E
FWD EXTRACT FANS .... ALL ON .... E
SPEED .... OBSERVE MAX TAT 100°C C

END//

AFTER SHUT DOWN OF A THIRD GROUP

TEMPERATURE SELECTOR .... COOLEST AUTO SETTING .... E
SPEED .... SUBSONIC C

END//

NOTE

If STANDBY temperature control system is used, COLD or negative settings may only be used at altitude greater than 30,000 ft.

(Unchanged)

BOTH FWD EXTRACT FLOW LIGHTS ON

● ▶ **WITH THE CONTROLLING FWD DISCHARGE VALVE SHUT**
DISCHARGE VALVES sws .... NORM .... E
SYSTEM SELECT sws .... OTHER SYSTEM .. E

IF FWD DISCHARGE VALVES REMAIN SHUT AND FWD FLOW LTS ON
FWD EMERGY RELIEF sw .... OPEN .... E
FWD EXTRACT FANS .... ALL ON .... E

IF FWD FLOW LTS STILL REMAIN ON
CABIN & FLIGHT DECK
TEMPERATURE SELECTORS .... COOLEST AUTO
SETTING .... E

AIR INTAKES, INS &
WEATHER RADAR .... MONITOR .... E

END//

CAUTION
IF AIR INTAKE FAILURE OCCURS REDUCE SPEED TO SUBSONIC AND APPLY APPROPRIATE PROCEDURES.

● ▶ **WITH THE CONTROLLING FWD DISCHARGE VALVE REGULATING NORMALLY**
FWD EMERGY RELIEF sw .... SHUT .... E

IF FWD FLOW LTS REMAIN ON
FWD EMERGY RELIEF sw .... OPEN .... E
FWD EXTRACT FANS .... ALL ON .... E

IF FWD FLOW LTS STILL REMAIN ON
CABIN & FLIGHT DECK
TEMPERATURE SELECTORS .... COOLEST AUTO
SETTING ....E

AIR INTAKES, INS &
WEATHER RADAR .... MONITOR .... E

END//

CAUTION
IF AIR INTAKE FAILURE OCCURS REDUCE SPEED TO SUBSONIC AND APPLY APPROPRIATE PROCEDURES.

RH OR LH FWD EXTRACT FLOW LIGHT ON

CABIN & FLIGHT DECK TEMPERATURE SELECTORS .... COOLEST AUTO SETTING ...... E

AIR INTAKES, INS & WEATHER RADAR .... MONITOR ...... E

END//

CAUTION

IF AIR INTAKE FAILURE OCCURS, REDUCE SPEED TO SUBSONIC AND APPLY APPROPRIATE PROCEDURES.

REAR EXTRACT FLOW LIGHT ON

REAR EXTRACT STANDBY FAN .... ON .... E

IF FLOW LT REMAINS ON
SPEED .... SUBSONIC C
HF & ADF .... MINIMUM USE ... C
REAR CABIN
TEMPERATURE SELECTORS .... COOLEST AUTO
SETTING .... E

IMMEDIATELY THE AIRCRAFT SPEED FALLS BELOW M ≑ 1.30

RAMP/SPILL MASTER sws .... ALL MAN .... E
AICU C/BS .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
AICU 1B SUP	14-216	A5
AICU 4A SUP	14-216	B5
AICU 2A SUP	13-216	A3
AICU 3B SUP	13-216	B3
AICU 4B SUP	2-213	B14
AICU 1A SUP	2-213	D14
AICU 3A SUP	2-213	H13
AICU 2B SUP	2-213	H14

FAILURE OF WINDOWS

NOTE

For electrical faults, arcing, or interlayer bubbling, the faulty circuit should be switched off.

● **FLIGHT DECK FORWARD WINDSCREEN**

IF CRACKED GLASS

REDUCE CABIN DIFFERENTIAL PRESSURE TO GIVE MINIMUM ACCEPTABLE PRESSURE LEVEL AT OPERATING ALTITUDE .... E

END//

IF DELAMINATION

CONTINUE FLIGHT IF VISION IS ACCEPTABLE C

END//

● **FLIGHT DECK SIDE WINDOWS** (SLIDING AND AFT)

IF INNER PANEL

TYPE OF FAILURE .... OBSERVE . ALL

IF CRACKED GLASS

REDUCE CABIN DIFFERENTIAL PRESSURE TO GIVE MINIMUM ACCEPTABLE PRESSURE LEVEL AT OPERATING ALTITUDE .... E

END//

IF DELAMINATION

CONTINUE FLIGHT

END//

IF OUTER PANEL IS CRACKED

SPEED .... LIMIT TO M = 1.90 .. C

END//

● **VISOR WINDOWS**

IF CRACKED GLASS OR DELAMINATION

CONTINUE FLIGHT

END//

IF COMPLETE FAILURE OF PANEL

SPEED .... LIMIT TO 325 kt C

END//

contd.

FAILURE OF WINDOWS (continued)

● CABIN WINDOWS

IF INNER PANEL
TYPE OF FAILURE .... OBSERVE .. E

IF CRACKED GLASS
REDUCE CABIN DIFFERENTIAL PRESSURE TO GIVE MINIMUM ACCEPTABLE PRESSURE LEVEL AT OPERATING ALTITUDE .... E

END//

IF DELAMINATION
CONTINUE FLIGHT

END//

IF OUTER PANEL IS CRACKED
SPEED .... LIMIT TO
M = 1.90 ... C

END//

CABIN EXCESS PRESSURE

CABIN DIFF PRESSURE	CONFIRM WARNING .... E
CABIN ALT sel	CONFIRM SETTING, IF NECESSARY SWITCH TO OTHER SYSTEM .... E

END//

NAC/WING O/HEAT LIGHT ON

BLEED VALVE .... SHUT .... E

FOR AFFECTED SYSTEM
APPLY PROCEDURE: SHUT DOWN OF AIR
CONDITIONING GROUPS

NOTE

If the warning light remains on 2 minutes after selecting the Bleed Valve shut, this indicates a possible hot air leak within the nacelle. Continued operation of the affected engine is permitted.

DUCT LIGHT ON

> CAUTION
> DO NOT ATTEMPT TO RESET THE DUCT DETECTION SYSTEM BY PRESSING THE DUCT LIGHT

COND VALVE .... OFF .... E

IF THE COND VALVE, BLEED VALVES AND CROSS BLEED MIs SHOW CROSSLINE
CROSS BLEED VALVES sws .... SHUT .... E
APPLY PROCEDURE: SHUT DOWN OF AIR CONDITIONING GROUPS (SHUT DOWN OF ONE GROUP)

> CAUTION
> UNDER NO CIRCUMSTANCES MAY THE AFFECTED BLEED VALVE AND CROSS BLEED VALVES BE OPENED

IF THE BLEED VALVE MIs SHOW INLINE
DUCT LT .... MONITOR .... E

IF THE DUCT LT REMAINS ON
APPLY PROCEDURE: SHUT DOWN OF AIR CONDITIONING GROUPS (SHUT DOWN OF ONE GROUP)

IF THE DUCT LT GOES OFF
FUEL EXCH LT .... OBSERVE .... E

IF THE FUEL EXCH LT ON
FUEL VALVE .... OPEN .... E
FUEL VALVE .... AS REQ'D .... E

IF THE FUEL EXCH LT OFF
TEMPERATURE SELECTOR .... STANDBY .... E

COND VALVE .... ON .... E

END//

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ANTI-ICING LEFT & RIGHT INT & CYCLIC LIGHTS ON

● ▶ TOTAL TEMPERATURE IS GREATER THAN + 15°C
WING & INTAKE ANTI-ICING
rty sels (2) .... OFF .... E

END//

● ▶ TOTAL TEMPERATURE IS LESS THAN + 15°C
WING & INTAKE ANTI-ICING
SELECTED rty sel .... OFF .... E
WING & INTAKE ANTI-ICING
OTHER rty sel .... 4 SECS ON ..... E

▶ IF LEFT OR RIGHT INT LT ON
LE//

▶ IF CYCLIC LT ON
APPLY PROCEDURE: ANTI-ICING CYCLIC LIGHT ON

IF LEFT AND RIGHT INT & CYCLIC LTS REMAIN ON
WING & INTAKE ANTI-ICING
ALTERN rty sel .... 4 SECS ON ..... E
TEMP O/RIDE pb .... PRESS .... E

IF LEFT AND RIGHT INT & CYCLIC LTS REMAIN ON
LEAVE ICING CONDITIONS

END//

ANTI-ICING INT LIGHT ON

●▶ WITH WING & INTAKE ANTI-ICING MAIN OR ALTERN rty sel AT 4 SECS ON
LE//

END//

●▶ WITH WING & INTAKE ANTI-ICING rty sels (2) AT OFF
CONTINUOUS DE-ICING AC POWER C/B's . TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
LH WING CONTN IND	15-216	B15
INT 4 REAR RAMP HTR SUP	14-216	A14
INT 4 AUX DOOR D BOX HTR SUP	14-216	A15
RH WING SECT 13.7, 15.3 HTRS CONTN SUP	14-216	B12
RH WING SECT 14.1, 14.2 HTRS CONTN SUP	14-216	B13
RH WING FAIRING & SECT 13.1 HTRS CONTN SUP	14-216	B15
RH WING SECT 13.5, 13.6 HTRS CONTN SUP	14-216	C12
RH WING SECT 15.1, 15.2 HTRS CONTN SUP	14-216	C13
RH WING SECT 13.2, 13.3 & 13.4 HTRS CONTN SUP	14-216	C15
INT 3 AUX DOOR D BOX HTR SUP	13-216	A10
INT 3 REAR RAMP HTR SUP	13-216	A11
INT 2 AUX DOOR D BOX HTR SUP	13-215	A9
INT 2 REAR RAMP HTR SUP	13-215	A10
INT 1 REAR RAMP HTR SUP	14-215	B6
INT 1 AUX DOOR D BOX HTR SUP	14-215	B7
LH WING SECT 13.7, 15.3 HTRS CONTN SUP	14-215	C6
LH WING SECT 14.1, 14.2 HTRS CONTN SUP	14-215	C7
LH WING FAIRING & SECT 13.1 HTRS CONTN SUP	14-215	C8
LH WING SECT 13.5, 13.6 HTRS CONTN SUP	14-215	D6
LH WING SECT 15.1, 15.2 HTRS CONTN SUP	14-215	D7
LH WING SECT 13.2, 13.3 & 13.4 HTRS CONTN SUP	14-215	D8
RH WING CONTN IND	15-215	B11

END//

ANTI-ICING CYCLIC LIGHT ON

● ▶ WING & INTAKE ANTI-ICING rty sels (2) AT OFF
WING & INTAKE ANTI-ICING
DC C/BS .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
LH WING CONTN IND	15-216	B15
RH CYCLIC TIMER CONT	15-216	D14
RH WING CONTN IND	15-215	B11
LH CYCLIC TIMER CONT	3-213	B11

END//

● ▶ WING & INTAKE ANTI-ICING MAIN OR ALTERN rty sel AT 4 SECS ON
CYCLIC LT .... OBSERVE .... E

IF CYCLIC LT ON STEADY FOR MORE THAN 16 SECS
WING & INTAKE ANTI-ICING
rty sel .... OFF .... E

IF CYCLIC LT REMAINS ON
WING & INTAKE ANTI-ICING
DC C/BS .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
LH WING CONTN IND	15-216	B15
RH CYCLIC TIMER CONT	15-216	D14
RH WING CONTN IND	15-215	B11
LH CYCLIC TIMER CONT	3-213	B11

LEAVE ICING CONDITIONS AS SOON AS POSSIBLE

END//

IF CYCLIC LT OFF
WING & INTAKE ANTI-ICING
rty sel .... 4 SECS ON ..... E
CYCLIC LT .... PRESS AND RELEASE .... E

IF CYCLIC LT ON
LEAVE ICING CONDITIONS
END//

CAUTION
RESET OF THE CYCLIC DE-ICING SYSTEM MUST NOT BE REPEATED.

IF CYCLIC LT OFF AFTER A MAXIMUM OF 16 SEC
FAULTY AREA .... LOG .... E

END//

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SMOKE WARNING

● ▶ IF SMOKE LTS A,B,D,E,F,H,J OR K ON
APPLY PROCEDURE : ELECTRICAL SMOKE OR FIRE

● ▶ IF SMOKE LT C OR G ON
APPLY PROCEDURE : FREIGHT HOLD FIRE

● ▶ IF SMOKE LTS 1,2,3 OR 4 ON
APPLY PROCEDURE : AIR CONDITIONING SMOKE

FREIGHT HOLD FIRE

REVISE FLIGHT PLAN TO LAND AS SOON AS POSSIBLE

REQUEST GROUND SERVICES STANDBY ON LANDING AND ADVISE ON AFFECTED FREIGHT HOLD ETC.

AIR CONDITIONING SMOKE

OXYGEN (IF REQ'D) .... ON 100% ..... ALL
CREW COMMUNICATION .... ESTABLISH ... ALL
SMOKE GOGGLES (IF REQ'D) .... ON .... ALL
COND VALVE .... OFF .... E
AIR GENERATION SMOKE rty sel .... INHIB .... E

WAIT 5 MINUTES THEN
COND VALVE ....ON.............. E

IF SMOKE IS DETECTED
COND VALVE .... OFF .... E
AIR GENERATION SMOKE rty sel .... NORM .... E
APPLY PROCEDURE: SHUT DOWN OF AIR
CONDITIONING GROUPS

CABIN FIRE

CABIN STAFF WILL REPORT ALL CABIN FIRES TO THE FLIGHT DECK AND ATTEMPT TO EXTINGUISH THE FIRE.

PORTABLE OXYGEN BOTTLES MUST NOT BE USED AS BREATHING APPARATUS WHEN FIRE FIGHTING.

ALL PASSENGER OXYGEN .... OFF .... E
CHECK PASSENGER OXYGEN LTS .... OUT .... E

ALLOW NORMAL AIR CONDITIONING TO CLEAR SMOKE. FLIGHT ENGINEER SHOULD INSPECT FOR DAMAGE AT THE EARLIEST OPPORTUNITY.

CAUTION

PORTABLE OXYGEN BOTTLES AND MASKS ARE NOT CLOSED CIRCUIT AND THEREFORE GIVE NO PROTECTION AGAINST SMOKE OR TOXIC GASES. OXYGEN LEAKAGE FROM THE MASK MAY INCREASE THE HAZARD.

END//

ELECTRICAL SMOKE OR FIRE

OXYGEN (IF REQ'D)	ON 100%	ALL
CREW COMMUNICATION	ESTABLISH	ALL
SMOKE GOGGLES (IF REQ'D)	ON	ALL

IF SMOKE ORIGIN LOCATED AND CAN BE SAFELY ISOLATED, OR IF SYSTEM MALFUNCTION OBSERVED

REMOVE RELEVANT POWER SUPPLY

END//

IF SMOKE ORIGIN NOT LOCATED AND FLIGHT DECK OR CABIN VISIBILITY REDUCED

EMERG GEN	MANUAL CHECK VOLTS & FREQUENCY	E
ENGINE FEED PUMPS	ALL ON	E
ENGINE RECIRCULATION VALVES	ALL SHUT	E
SERVO CONTROLS YELLOW rty sel	YELLOW GREEN	C
REAR EXTRACT STANDBY FAN	ON	E
F/O ASI AND ALTIMETER	STANDBY MODE	P
ADC 2	OFF	P
AC ESS BUS sws	ALL EMERG	E
AIR INTAKE LANE rty sel	1 AND 3 TO A 2 AND 4 TO B	E
AIR INTAKE HYD sel	1 TO GREEN 3 TO BLUE 2 AND 4 TO YELLOW	E
ENGINE CONTROL SCHEDULE	ABOVE 220 KT HI.	E
	BELOW 220 KT LO.	E

CAUTION

INS No.2 AND NO.3 WILL AUTOMATICALLY REVERT TO BATTERY POWER. THEIR LIFE IN NAV MODE IS 15 MINUTES.

GENERATORS	ALL OFF	E
BATTERY sels (2)	ESS MAIN SPLIT.	E
THROTTLE MASTERS	MAIN	E
WING & INTAKE ANTI-ICING	OFF	E
NO.1 & 2 ANTI-STALL	OFF	P
NO.1 AUTOSTAB	ENGAGE	P
NO.1 ARTIFICIAL FEEL	ENGAGE	P
SSB sw	OPEN	E
BTB sels (4)	TRIP	E

contd.

ELECTRICAL SMOKE OR FIRE (continued)

WHEN SMOKE, CABIN & FREIGHT HOLD LTS ARE OFF AND/OR SMOKE CLEARED.

RESET MAIN GENERATORS IN TURN TO IDENTIFY THE BUSBAR SUPPLYING THE DEFECTIVE EQUIPMENT. ALLOW APPROXIMATELY 1 MINUTE BETWEEN EACH SELECTION.

WHEN THE DEFECTIVE SUPPLY IS IDENTIFIED

AFFECTED GENERATOR .... OFF .... E

CAUTION
LEAVE ASSOCIATED BTB TRIPPED
LEAVE ASSOCIATED AC ESS BUS SWITCH AT EMERG

SERVICEABLE CHANNELS .... MANUAL PARALLEL .... E
SSB sw .... CLOSE .... E
AC ESS BUS sw(s) (SERVICEABLE CHANNELS) .... NORM .... E

IF NO 3 AC MAIN BUS LT ON
AIR INTAKE LANE rty sels .... 2 TO B
3 TO A .... E

IF NO 4 AC MAIN BUS LT ON
AIR INTAKE LANE rty sels .... 1 TO A
4 TO B .... E

BATTERY sels (2) .... BATT ON .... E

CAUTION
EMERGENCY GENERATOR MUST BE LEFT ON LINE WITH ONE OR MORE AC ESS BUS SWITCHES AT EMERG

IF EMERGENCY GENERATOR NOT REQUIRED
EMERG GEN .... AUTO .... E
EMERG GEN NORM/ISOL sw .... ISOL
THEN NORM ...... E

END//

contd.

ELECTRICAL SMOKE OR FIRE (CONTINUED)

⇩

NOTE

ON EMERGENCY ELECTRICS

The following are AVAILABLE

Normal pressurisation control
Fuel TOTAL CONTENTS indications & FQIs
FASTEN SEAT BELTS and NO SMOKING signs
Standby horizon
Captain's ADF/RMI
First Officer's VOR/RMI
Voice recorder
Public address
TRK/HDG Unit
Marker
Interphone audio selector panels (4)
No.1 ADC, INS, ADI, Compass Coupler and HSI.
No.1 ADF, VOR, DME, ILS and Radio Altimeter.
No.1 ATC Transponder, VHF and HF.

The engine operating schedule will be MID with HI selected and gear up:
it will be LO with any other selection

The following are NOT AVAILABLE

Autopilot
Autothrottle
Normal landing gear operation
Normal visor/nose operation
Visor/nose position indicator
Reverse thrust
Nosewheel steering
Landing lights
Reheat
Normal brakes

WHEEL BRAKE FIRE

ATC	INFORM	P
AIRCRAFT	STOP, USING MINIMUM BRAKE PRESSURE	C
BRAKES	EMERG	C
ALL ENGINES	SHUT DOWN	E
UNAFFECTED WHEELS	CHOCKED	G
BRAKES	RELEASE	P

IF NECESSARY
APPLY PROCEDURE : PASSENGER EVACUATION
ON LANDING

END//

FLAME SENSOR LIGHT ON

CAUTION

DURING THE INITIAL DIAGNOSTIC ACTIONS OF THE DRILL THE RED ENG MWS AND ENGINE SHUT DOWN HANDLE LIGHTS MAY BE ON.
DO NOT CARRY OUT AN ENGINE SHUT DOWN AT THIS STAGE.

SET ASSOCIATED FLAME SENSORS sel TO A THEN B.
LEAVE sel IN POSITION WHERE THE ENG O/HEAT LT IS OFF.

SET THE ENG O/HEAT TEST rty sel TO TEST POSITIONS F1, F2 AND F3 IN TURN, THEN OFF.

IF THE ENG O/HEAT LT IS ON AT F1,F2 AND F3
CONTINUE NORMAL FLIGHT USING THE SINGLE SELECTED LOOP

END//

IF THE ENG O/HEAT LT IS OFF AT ONE OR MORE TEST POSITIONS F1, F2 OR F3

FLAME SENSORS sel	ALTERNATIVE A OR B POSN	E

ON ILLUMINATION OF THE RED ENG MWS AND ENGINE SHUT DOWN HANDLE LTS FOR THE AFFECTED ENGINE
APPLY PROCEDURE : ENGINE FIRE, OVERHEAT
OR SEVERE DAMAGE

END//

(Unchanged)

EMERGENCY LANDING

ATC TRANSPONDER	A7700	P
DISTRESS MESSAGE	TRANSMIT	P
CABIN CREW AND PASSENGERS	BRIEF	C
FUEL JETTISON	AS REQUIRED	CE
HARNESS	SECURE	ALL
CABIN	DEPRESSURISE BELOW 10,000 FT.	E

APPROACH CHECKLIST

EMERGENCY LANDING BRIEFING	UPDATED	C
F/D DOOR sw	OPEN	E
SEAT BELT SIGNS	ON	E
NO SMOKING SIGNS	ON	E
EMERGENCY LTS	ARM	E
DRAIN MAST HTRS	OFF	E
ALTIMETERS	SET/CROSS CHECKED	ALL
RADIO ALTIMETERS	DH SET	ALL
ENG RATING MODE	TAKE-OFF	E
RAD/INS sws	RAD	ALL
VISOR	DOWN 5° LT OFF	EP
NOSE	5 DEG	EP
FUEL/WEIGHT/CG	CHECKED	E
TARGET THRESHOLD SPEED	BUGGED	ALL
ENGINE FEED PUMPS	ALL ON	E
FUEL CROSSFEED VALVES	SHUT	E
ENGINE RECIRCULATION VALVES	SHUT	E
APPROACH CHECKLIST	COMPLETED	E

LANDING CHECKLIST

LANDING GEAR	DOWN 4 GREENS	ALL
NOSE	DOWN, GREEN	EP
VISOR STBY CONTROL	VISOR LOWER	P
BRAKES	CHECKED/NORM	P
ANTI-SKID	CHECKED	P
SECONDARY AIR DOORS	SHUT	E
BRAKE FANS	ON	E
RADAR	STANDBY	E
YELLOW PUMP	ON/PRESSURE NORMAL	E
AUX INLETS MIS	OPEN/CROSS-HATCHED	E
SEATS	LOCKED/PWR OFF	ALL
LANDING CHECKLIST	COMPLETED	E

AT 1,000 FT-CALL ON PA
"TAKE UP EMERGENCY POSITION" .... P

AT 200 FT-CALL ON PA
"BRACE BRACE" .... P

END//

PASSENGER EVACUATION ON LANDING

ADVISE CABIN CREW AND PASSENGERS OF INTENTION TO EVACUATE		C
NOTIFY CABIN CREW OF ANY CONDITIONS THAT MAY AFFECT EVACUATION		C
TOWER/GROUND CREW	NOTIFY	P
BRAKES LEVER	PARK	C
ENGINE SHUT DOWN HANDLES	PULL	CE
CONTROL COLUMN	PUSH FULLY FWD AND RELEASE	C
SEVEN SECONDS AFTER PULLING ENGINE SHUT DOWN HANDLES		
2 SHOT	PRESS	E
PASSENGER EVACUATION	INITIATE	C
BATTERY sels	BATT OFF	E

CAUTION

AT LEAST 10 SECONDS MUST ELAPSE BETWEEN PULLING THE ENGINE SHUT DOWN HANDLES AND TURNING OFF THE BATTERY CONTROL SELECTORS TO ALLOW THE LP VALVES TO SHUT

EVACUATION	EVACUATE AIRCRAFT.ASSIST CABIN CREW	ALL

END//

NOTE

If neither of the forward slides are available at least one flight crew member is to use the forward vestibule escape rope and align any retrievable slides.

DITCHING

ATC TRANSPONDER .... A7700 .... P
DISTRESS MESSAGE .... TRANSMIT .... P
CABIN CREW AND PASSENGERS .... BRIEF .... P
FUEL JETTISON .... AS REQUIRED ... CE
GPW C/B .... TRIP .... E
L/GEAR WARN C/B .... TRIP .... E

CIRCUIT BREAKER	PANEL	GRID REF
GROUND PROXIMITY WARN AC SUP	13-215	G4
AUDIO WARN SYS SUP 1	1-213	M21

AT 180 KNOTS
AUDIO .... CANCEL .... E

NOTE

With the GPW circuit breaker tripped all modes of operation of the ground proximity system will be inhibited.

With the L/GEAR WARN circuit breaker tripped the audio will operate at 180 knots.

HARNESS .... SECURE .... ALL
DISCHARGE VALVE sws (2) .... NORMAL .... E
CABIN .... DEPRESSURISE
BELOW
10,000 FT ...... E

APPROACH CHECKLIST

DITCHING BRIEFING .... UPDATED C
F/D DOOR sw .... OPEN .... E
SEAT BELT SIGNS .... ON .... E
NO SMOKING SIGNS .... ON .... E
EMERGENCY LTS .... ARM .... E
ALTIMETERS .... SET/CROSS
CHECKED ...... ALL
RADIO ALTIMETERS .... DH.SET .... ALL
ENG RATING MODE .... TAKE-OFF .... E
RAD/INS sws .... RAD .... ALL
CG .... 53.5% .... E
TARGET THRESHOLD SPEED .... BUGGED .... ALL
ENGINE FEED PUMPS .... ALL ON .... E
FUEL CROSSFEED VALVES .... SHUT .... E
ENGINE RECIRCULATION VALVES .... SHUT .... E
APPROACH CHECKLIST .... COMPLETED ...... E

contd.

DITCHING (continued)

⇩

LANDING CHECKLIST

LANDING GEAR	UP	ALL
NOSE	UP	ALL
VISOR	UP	ALL
RAMP/SPILL MASTERS	MAN	E
RAMPS	0%	E
BLEED VALVES	SHUT	E
DITCHING VALVES	SHUT	E
SEATS	LOCKED/ PWR OFF	ALL
LANDING CHECKLIST	COMPLETED	E

AT 1,000 FT-CALL ON PA
"TAKE UP DITCHING POSITION" .... P

APPROACH FOR TOUCHDOWN

ON LEAVING 1000 FT ALTITUDE

AUTOPILOT	ENGAGED	C
AUTOTHROTTLE	ENGAGED	C
APPROACH SPEED	VREF	C
RATE OF DESCENT	300 FT/MIN	C

AT 200 FT-CALL ON PA
"BRACE BRACE"

AT 50 FT

AUTOTHROTTLE	DISENGAGE MAINTAIN EXISTING POWER SETTINGS	C

REDUCE RATE OF DESCENT FOR TOUCHDOWN AT A PITCH ATTITUDE OF APPROXIMATELY 15°

ON TOUCHDOWN

ENGINE SHUT DOWN HANDLES	PULL	CE

HOLD PITCH ATTITUDE AS LONG AS POSSIBLE

PASSENGER EVACUATION	INITIATE	C
EVACUATION	EVACUATE AIRCRAFT ASSIST CABIN CREW	ALL

END//

NOTE
Disconnection of Autopilot during the approach for touchdown is left to the discretion of the pilot.

GROUND PROXIMITY PULL-UP WARNING

CALL ...."PULL-UP WARNING"..... P
AUTOPILOT .... DISCONNECT C
FULL POWER .... APPLY .... E
ATTITUDE .... ADJUST C
LANDING GEAR .... UP .... P

CAUTION

1. DO NOT DISREGARD SHORT DURATION WARNING-TAKE IMMEDIATE ACTION.
2. AFTER WARNING CEASES,
   (a) CHECK AIRCRAFT POSITION
   (b) CHECK RADIO AND PRESSURE ALTIMETERS
   (c) CHECK ALTIMETER SETTINGS
   (d) DETERMINE MINIMUM SAFE ALTITUDE

END//

AMBER RADIATION LIGHT ON

OBTAIN PROVISIONAL ATC CLEARANCE FOR DESCENT IN THE EVENT THAT RADIATION REACHES THE "ACTION" LEVEL (RED RADIATION LIGHT ON)

RED RADIATION LIGHT ON

CONFIRM ATC CLEARANCE AND ADVISE DESCENDING.

DESCEND TO AN ALTITUDE SUCH THAT THE INTENSITY IS BELOW "ACTION" LEVEL I.E. THE RED RADIATION LIGHT OFF.

IF WARNING PERSISTS BELOW FL 470
NO FURTHER ACTION

END//

NOTE
If due to communication failure descent clearance cannot be obtained, descent is at the captain's discretion.

(Completely Revised)

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NORMAL CHECKLIST

Safety checklist 07.15.03
Preliminary cockpit checklist 07.15.03
Before start checklist 07.15.04
Pushback checklist 07.15.05
Afterstart checklist 07.15.05
Taxi checklist 07.15.06
Before take-off checklist 07.15.06
After take-off checklist 07.15.07
Transonic checklist 07.15.07
Deceleration and descent checklist 07.15.08
Approach checklist 07.15.08
Landing checklist 07.15.09
After landing checklist 07.15.10
Parking checklist 07.15.10
Stopover checklist 07.15.11
Flight Engineer's leaving panel check 07.15.12

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(Unchanged)

SAFETY CHECKLIST

GROUND SERVICE sw	ON
BOARDING, RACKING AREA AND ROOF lts	ON
L/GEAR STANDBY LOWERING lever	GUARDED
TRANSPONDER	STBY
RADAR	OFF
EMERGENCY NOSE/VISOR UPLOCK RELEASE	DOWN/PIN ENGAGED
NOSE AND VISOR STBY CONTROL	OFF/GUARDED
L/GEAR NORMAL lever	DOWN
GEAR O/RIDE	GUARDED
VISOR/NOSE lever	AS CONFIGURATION
AUTO IGNITION sws	OFF
ADS/ENGINE PROBE HEATERS	OFF
WING INTAKE ANTI-ICING TEST	OFF
FUEL FWD TRANS sw	GUARDED
TRIM TRANS AUTO MASTER sel	OFF/GUARDED
TANK 11 INLET VALVES sels	AUTO/OFF
STANDBY INLET VALVES sws	SHUT
TRIM PIPE DRAIN sw	SHUT
JETTISON PANEL COVER	CLOSED
RAM AIR TURBINE sels	GUARDED
W/SHIELD EMERG DE-ICE sws	OFF/GUARDED
CIRCUIT BREAKERS	SET

PRELIMINARY COCKPIT CHECKLIST

TECHNICAL LOG	CHECK
GROUND POWER	ON
EQUIPMENT BAY COOLING PANEL	CHECK/SET
OXYGEN PANEL	CHECK/SET
DRAIN MAST HEATERS	CHECK/SET
INS 1,2 & 3	SELECT ALIGN, TEST & PRESENT POSITION
AIR DATA COMPUTERS	ON
COCKPIT EMERGENCY EQUIPMENT	CHECK
Fire axe, asbestos gloves, portable oxygen mask and pack, life jackets (5), eye wash kit, fire extinguisher, smoke goggles (3) and escape ropes (2)	
FLIGHT ENGINEER'S DOCUMENTATION STOWAGES	CHECK

Unchanged

BEFORE START CHECKLIST

MASTER CBs	SET/CHECKED	ALL
COCKPIT PREPARATION	COMPLETE	ALL
OXYGEN	CHECKED 100%	ALL
DV WINDOWS	CLOSED	CP
FLIGHT CONTROL INVERTERS	ON	P
ANTI-STALL SYSTEMS	ON	P
RAD/INS sws	RAD	CP
INSTRUMENT TRANSFER sws	SET	CP
ALTIMETERS	CHECKED/SET	ALL
NAV RADIOS	SET	ALL
BRAKES	PARK/CHECKED	PE
THROTTLES	IDLE	E
NAV LIGHTS	AS REQUIRED	E
THROTTLE MASTERS	ON	E
GROUND HYD. CHECK OUT	YELL, YELL/OFF	E
FUEL HEATERS	AUTO	E
ENGINE RECIRC VALVES	SHUT	E
SECONDARY AIR DOORS	AUTO	E
BATTERIES	ON	E
INS 1, 2 & 3	LOADING CHECKED NAV MODE/MIX	ALL
ASI BUGS & PITCH INDEX	SET	ALL
CLOCK ENG & TLA BUGS	SET	ALL
BRIEFING	STATED	C

LOADSHEET	CHECKED	ALL
ZFW & ZFCG	SET/CHECKED	EC
FUEL REM. & A/C WEIGHT	SET/CHECKED	ALL
LOAD LIMITS	SET	E
ASI BUGS & PITCH INDEX	UPDATE	AL
CLOCK ENG AND TLA BUGS	UPDATE	ALL
START CLEARANCE	OBTAIN	P
DOOR LIGHTS	CHECKED	E
MASTER WARNING	RECALL	C
ANTI-COLLISION LIGHTS	ON	E
ENGINE FEED PUMPS	ON	E
CLEARANCE TO START	OBTAIN	EG
START ENGINES	AS REQUIRED	EG

PUSHBACK CHECKLIST

NOs 3 & 2 ENGINES . . . . START . . . . E
BRAKE FANS . . . . ON . . . . E
HYDRAULICS . . . . CHECKED . . . . E
CROSSBLEED VALVES 2 & 3 . . . . . OPEN . . . . E
GROUND EQUIPMENT . . . . CLEAR . . . . P.G

PUSHBACK

NOs 4 & 1 ENGINES . . . . START . . . . E
PUSHBACK CHECKLIST . . . . COMPLETED . . . . . . P

AFTER START CHECKLIST

NOSEWHEEL STEERING . . . . CHECKED . . . . P
FLT.CONTROL, AFCS & TRIMS . . . . CHECKED C
STAB & FEEL . . . . ENGAGED . . . . P
ENGINE ANTI-ICE . . . . AS REQUIRED . . . . . E
BRAKE FANS . . . . ON . . . . E
GROUND IDLE . . . . LOW . . . . E
DOOR WARNINGS . . . . TESTED/OFF . . . . . E
ENGINE FEED PUMPS . . . . ALL ON . . . . E
HYDRAULICS . . . . CHECKED . . . . E
ELECTRICS . . . . CHKD: GRD BYPASS . E
GROUND EQUIPMENT . . . . CLEAR P.G.
AFTER START CHECK . . . . COMPLETE . . . . . . P

TAXY CHECKLIST

NOSE/VISOR	DOWN/5 DEG	P
BRAKES	CHECKED/NORM	C
FLIGHT INSTRUMENTS	CHKD/NO FLAGS	ALL
FLIGHT CONTROLS/EFC	CHECKED/LIGHT OFF	C
TRIMS	SET	ALL
ENGINE RATING MODE	TAKE-OFF	E
AUTO IGNITION	ON	E
THROTTLES	CHECKED	E
DRAIN MAST HEATERS	ON	E
ENGINE FLIGHT RATING	CLIMB	E
PRESS STATIC HEATERS	ON	E
ADS & STBY HEATERS	Tt INHIB/ON	E
AIR INTAKES	CHECKED/SET	E
ENGINE CONTROL SCHEDULE	CHECKED	E
ENG 4 T/O N_1 LIMITER	88%	E
AIR CONDITIONING	CHECKED/SET	E
FUEL LP PROTECTION sw	ARMED	E
DE-AIR PUMPS	ON	E
FUEL CONSUMED INDICATORS	CHECKED	E
ENGINE FEED PUMPS	ALL ON	E
CROSSFEED VALVES	SHUT	E
REVERSE ASOVs	CHECKED/18-24 DEG	EC
ENGINE O/HEAT	CHECKED	E
SEATS & HARNESS	LOCKED, PWR OFF & SEC	ALL
CABIN/SLIDES	SECURE/ARMED	S
TRIM TANK CONTENTS	CHECKED	E
TAKE-OFF CG sw	AS REQD	CE
CG POSITION	CHECKED	ALL
MAIN TRANSFER PUMPS	FOUR ON	E
TAXY CHECK	COMPLETE	E

BEFORE TAKE-OFF CHECKLIST

BRIEFING	UPDATED	C
CABIN CREW CALL	3 PRESSES	E
LANDING LIGHTS	AS REQUIRED	P
TRANSPONDER	SET	P
WHEEL O/HEAT LIGHT	OFF	PE
OVERLOAD MI	BLACK	E
GROUND IDLE	HIGH	E
MASTER WARNING	RECALL/INHIBIT	C
T/O MONITOR	ARMED	P
REHEAT	ON	E
PITCH INDEX	CHECKED	ALL
BEFORE TAKE-OFF CHECK	COMPLETE	E

AFTER TAKE-OFF CHECKLIST

LANDING GEAR	UP: LIGHTS OFF NEUTRAL	PE
LANDING LIGHTS	OFF/RETRACT	P
MASTER WARNING	RECALL	P
ADS & STBY HEATERS	ON	E
NO SMOKING SIGNS	OFF	E
ENGINE RATING MODE	FLIGHT	E
PRESSURIZATION	CHECKED	E
NOSE/VISOR	UP/LOCKED	PE
ALTIMETERS	SET	ALL
AFTER TAKE-OFF CHECK	COMPLETE	E

At M = 0.7 CLIMB CHECK

FUEL TRANSFER	AFT	E
TAKE-OFF CG sw	NORMAL	E
BRAKE FANS	OFF	E
ENGINE CONTROL SCHEDULE	NORMAL	E
SECONDARY AIR DOORS	OPEN	E
FLIGHT DECK DOOR	NORMAL	E
SEAT BELT SIGNS	AS REQUIRED	E
TAXI TURN LTS	OFF	P
CLIMB CHECK	COMPLETE	E

TRANSONIC CHECKLIST

AUXILIARY INLETS	SHUT	E
SECONDARY NOZZLES	<15 DEG	E
REHEAT	ON	E
FUEL TRANSFER	TRANSFER AFT	E

At M = 1.0

PRESS STATIC HEATERS	OFF	E
ENGINE ANTI-ICING	OFF	E
WING & INTAKE ANTI-ICING	OFF	E
TRANSPARENCY DE-ICE, DEMIST.	OFF	P

At M = 1.1

SECONDARY NOZZLES	0-5 DEG	E
INTAKE LANES	1 & 2 AUTO A 3 & 4 AUTO B	E

At M = 1.7

REHEAT	OFF	E
AFCS	SET	E

When Fuel Transfer Is Complete

FUEL TANK PRESSURE	CHECKED	E
DE-AIR PUMPS	OFF	E

At 500

ENGINE FLIGHT RATING	CRUISE	E
INTAKE LANES	ALL AUTO A OR B	E
TRANSONIC CHECK	COMPLETE	E

(Unchanged)

DECELERATION AND DESCENT CHECKLIST

WARNING AND LDG DISPLAY	CHECKED	CP
BRIEFING	STATED	C
SAFETY HEIGHT	CHECKED	ALL
ASI BUGS	SET	ALL
HARNESS	SECURE	ALL

At Deceleration Point

ENGINE RECIRC VALVES	OPEN	E
THROTT ISA-10°C OR WARMER	18°	CE
ISA-11°C OR COLDER	24°	
TANKS 1 & 4	NORM	E
TANK 11 HYDRAULIC PUMPS	OFF	E
FUEL TRANSFER	TRANSFER FWD	E
ENG FLIGHT RATING	CLIMB	E

At M = 1.6

THROTTLES	34°	CE

At M = 1.0

THROTTLES	IDLE	CE
PRESSURISATION	SET	E
PRESS STATIC HEATERS	ON	E
TRANSPARENCY DE-ICE, DEMIST	ON	P
DECELERATION AND DESCENT CHECKLIST	COMPLETED	E

APPROACH CHECKLIST

LANDING BRIEFING	UPDATED	C
TAXI TURN LTS	ON	P
RAD/INS sws	RAD	ALL
ALTIMETERS	SET/CROSS CHECKED	ALL
RADIO ALTIMETERS	DH SET	ALL
FLIGHT DECK DOOR sw	OPEN	E
CABIN SIGNS	BOTH ON	E
EMERGENCY LIGHTS	ARM	E
ENGINE RATING MODE	TAKE OFF	E
VISOR/NOSE	DOWN/5 DEG	EP
BRAKE FANS	ON	E
ENGINE RECIRC VALVES	SHUT	E
ENGINE CONTROL SCHEDULE	APPROACH	E
FEED PUMPS	ALL ON	E
CROSS FEED VALVES	SHUT	E
SSB	AS REQUIRED	E
BATT sels	AS REQUIRED	E
FUEL/WEIGHT/CG	CHECKED	E
ASI BUGS	UPDATE	ALL
SEATS	LOCKED: PWR OFF	ALL
QNH	SET	ALL
AUTO PILOT CHANGEOVER	CHECKED	C
APPROACH CHECK	COMPLETE	E

EMERGENCY/ABNORMAL DRILLS

LANDING CHECKLIST

LANDING GEAR	4 GREENS	ALL
CABIN CREW CALL	3 PRESSES	E
NOSE	DOWN & GREEN	PE
BRAKES	CHECKED/NORMAL	P
ANTI-SKID	CHECKED	E
RADAR	STANDBY	E
AUX INLETS	OPEN/X-HATCH	E
SECONDARY AIR DOORS	SHUT	E
YELLOW SYSTEM	CHECKED	E
LANDING CHECK	COMPLETE	E

LAND WEIGHT (1000kg)	VREF KTS
96	150
98	152
100	154
102	155
104	157
106	158
108	160
110	161
111	162
115	165
120	168
125	172
130	175
135	179
140	182
145	185
150	188
155	191
160	194
165	197
170	201
175	204
180	207

NOTE: When calculating the RELAND reference speed for the data card use a landing weight equal to take-off weight minus 3500 kg.

CONFIGURATION	ABNORMAL INCREMENT	VT MAX
3 ENGINE	5	10
2 ENGINE	7	17
NO AUTOTHROTTLE	7	17
TOTAL LOSS OF:- ELECTRIC TRIM OR PITCH AUTOSTAB OR ELECT.FLIGHT CONTROL	10	10

AFTER LANDING CHECKLIST

MASTER WARNING	INHIBIT	C
GROUND IDLE sws	LOW	E
RAMP SPILL MASTER sws	MAN	E
AUTO IGNITION	OFF	E
PRESS STATIC HEATERS	OFF	E
ADS AND STBY HEATERS	OFF	E
DRAIN MAST HTRS	AS REQUIRED	E
WING & INTAKE ANTI-ICING	OFF	E
W/SHIELD EMERG DE-ICE sws	OFF/GUARDED	E
FLIGHT CONTROL INVERTERS	OFF INV	P
NOSE	5 DEG	E.P
TRANSPONDER	STANDBY	E
PRESSURISATION	CHECKED	E
SSB	CLOSED	E
BATTERY SWS	ON	E
BRAKES TEMP lts	CHECKED	E
SLIDES	DISARMED	E
TANK 9 SHUT DOWN FUEL	4,000 KG	E
AFTER LANDING CHECKLIST	COMPLETED	E

PARKING CHECKLIST

BRAKES	PARK	C
LANDING LIGHTS	OFF/RETRACT	C
EMERG GENERATOR sel	AUTO	E
VISOR NOSE	AS REQUIRED	P
GROUND POWER	ON	E
HP VALVES	SHUT	E
THROTTLE MASTERS	OFF	E
ANTI-COLLISION lts	OFF	E
FASTEN SEAT BELTS	OFF	E
ENGINE ANTI-ICING	OFF	E
IGNITION	OFF	E
GROUND CONDITIONING	AVAILABLE	E.G
TRANSPARENCY DE-ICE, DEMIST	OFF	C
FUEL PANEL	GROUND STATE	E
BATTERIES	BATT OFF	E
INS	POST FLT INTO	P
CHOCKS	IN POSITION	G
BRAKES	NORM	C
BRAKE FANS	AS REQUIRED	E
RADIATION METER	NOTED	E
ITEM	CHECKED	E
INS	RELOAD (TRANSIT)	PE
PARKING CHECKLIST	COMPLETED	E

(Unchanged)

STOPOVER CHECKLIST

AIR DATA COMPUTERS	OFF	E
INS	OFF	E
RADAR	OFF	E
FLIGHT CONTROL INVERTERS	PWR OFF	P
EMERGENCY lts	OFF	E
ENGINE VIBRATION SUPPLY	OFF	E
OXYGEN	OFF	E
GROUND POWER	AS REQUIRED	E
MASTER C/Bs	TRIP	E
STOPOVER CHECKLIST	COMPLETED	E

FLIGHT ENGINEER'S LEAVING PANEL CHECK

CABIN TEMPERATURE .... AUTO AND STABLE..E
CG .... CHECKED ....E
TRIM TRANSFER .... CHECKED ....E
FUEL TRANSFER .... SAFE ....E
ENGINE FEED PUMPS .... ALL ON ....E
CROSSFEED .... SHUT ....E
JETTISON SYSTEM .... VALVES SHUT/
COVER CLOSED ....E
EMERGENCY GENERATOR .... NORM/AUTO ....E

CREW TRAINING

Controls - The flight control system is fully powered without manual reversion. To ensure maximum safety a split surface design is incorporated with separate sources of power for each. Control inputs are via either of two electrical signalling channels or a mechanical channel. (Mechanical requires hydraulic pressure for the relay jacks and does not have autostab).

There is an Emergency Flight Control system which operates from strain sensors if the control runs jam such that the pilot cannot move the control column.

Under normal operating conditions the controls are excellent and precise, allowing the pilot to fly easily and accurately. Automatic trim devices (Mach trim, incidence trim, and speed trim) ensure that Concorde behaves with normal stability characteristics throughout the envelope.

Induced Drag - One of the features of the slender delta is the large increase in induced drag with reduction in airspeed on approach. Approaches on the back side of the drag curve require an awareness of the problem together with care and precision. The situation is normally handled by autothrottle but pilot throttle handling will be practised and shown to be not unduly demanding.

Autothrottle - Autothrottle is of a great assistance but its destabilising effect must be appreciated. Owing to the automatic maintenance of speed, the aircraft has no tendency to return to level flight after a pitch disturbance. This lack of stability can cause altitude deviations when hand flying if care is not exercised.

If autothrottle is inadvertently disengaged on approach it is necessary to re-select IAS ACQ when it is re-engaged.

Incidence Meter - This instrument will be found to greatly facilitate accurate hand flying. The rigging is such that for a particular altitude and speed (in one G flight) the incidence is equal to the pitch attitude required for level flight. It is only necessary to set the incidence on the pitch attitude bug to get a datum for level flight. Similarly, the required pitch attitude on a 3° glideslope is the incidence less 3°.

Sideslip Meter - This instrument measures true aerodynamic sideslip, compared with the traditional ball which measures lateral accelerations.

For optimum asymmetric performance, reduce the sideslip to zero (same sense as ball) and apply sufficient bank to maintain heading, resulting in a small residual bank angle (this bank will cause the ball to be off centre).

C of G - A novel feature of Concorde is the transference of fuel to move the centre of gravity to match the movement of centre of pressure with varying Mach number. It is essential that the pilots and F/E are thoroughly familiar with the flight envelope and CG corridor. A frequent check on Mach number and CG should be made on climb and descent, with particular attention during transonic acceleration and deceleration.

A full description entitled "Flight Envelope & Mach/CG Boundaries" is to be found in this section: 8-28.

CRUISE TRAINING

Bank - As with other aircraft, 30° is considered the maximum bank for normal smooth safe public transport flying.

Normal bank angles should be reduced when transonic and supersonic to avoid boom focusing and degrading performance. Reduced bank angles are also applicable after engine failures, for performance reasons.

If the bank applied by the Auto Pilot in a particular mode would be excessive use the turn knob. Similarly, do not use the Flight Director in a roll command mode if it would demand excessive bank.

Remember that, due to bank angles and TAS, the variations in turn radii on Concorde are extremely large.

Pitch Effects -

(1) Thrust. Increase in thrust causes the aircraft to pitch up.

(2) Gear. Lowering the gear has little effect on the pitch trim but the drag will cause a speed decay and this will result in a slight pitch down in the normal speed range (if Autothrottle is not engaged).

(3) Reverse. Reverse thrust in the air and on landing gives a nose up pitch change. It is very important that a firm forward pressure is maintained on the control column to resist this in the latter case.

Dutch Roll - This is quite innocuous on Concorde. If Dutch Roll is initiated by mishandling, the aircraft will normally recover on its own if allowed to do so, both with, and without autostabilisation. Without autostabilisation there is a possibility of pilot induced oscillations. These can be cured by releasing the control column momentarily. Use of large control deflections should be avoided.

High Incidence Warning & Protection -

(1) Approach to the Stick Shaker is demonstrated in the landing configuration noting incidence and the speed relative to V_{REF} which is bugged.

Above 11° of incidence, operation of the pitch trim wheel will be the indication of operation of incidence trim.

The Stick Shaker operates at 16½° incidence. Recover by applying full power and reducing pitch attitude to 0°. Pushing the stick forward is most important and requires considerable force. At 12° of incidence initiate a gentle recovery from the dive.

The Stick Shaker does not have phase advance.

(2) The same exercise is repeated with speed continuing to reduce until the Stick Wobbler operates. Recovery is as above.

The Wobbler operates at a nominal 19° but is a phase advance system.

CREW TRAINING

(3) If autostab is inoperative during these manoeuvres super stab is not available, and there is a tendency to over correct. (When Superstab is operative its effect may be noted on the FCPI)".

(4) If both electric trim systems are inoperative incidence trim is not available, making it easy to reach high incidences, due to the inherent pitch instability of the delta at high incidence.

Touch and Go - During training most of the landings will be touch and go. After landing, engines will not be reversed and brakes will not be applied. Maintain the runway centre line, keep one hand on the throttle levers and, when instructed, apply power smoothly for take-off. Reheat will not normally be used.

"V_1" and "Rotate" will be called by the intructor pilot.

(Deletion)

FLIGHT ENGINEER'S ROUTINE PROCEDURES

2. FLIGHT PROFILE

The flight profile is designed to give guidance to Flight Engineers on the phase of flight at which specific items should be monitored. It is presented in pictorial form and further amplified in these notes.

POSITION 1

Before Take-off Check completed.

Ensure that the take-off briefing and departure clearance is understood.

Ensure that the altitude clearance limit is set in the Altitude Selector Window.

Preselect Re-heat on the Re-heat Selectors.

Start stop watch.

POSITION 2

Scan the primary engine instruments and check for correct indications of full power. At 100 kts four Green Clear to Go lights should be illuminated and called. Correct for any exceedence of engine limitations. Once the take-off roll is fully under way with full power set, the Flight Engineer must not bring to the pilot's attention minor faults which could cause confusion or risk an unnecessary aborted take-off. If an engine failure is called do not include the engine location at this stage.

POSITION 3

Define engine failure or fire at the point given in the briefing. When a noise abatement procedure is being carried out, include the Captain's clock in the scan so that the 'NOISE' call is not missed.

POSITION 4

When Noise is called select Re-heat OFF, reduce the engine power to the required setting and call "....%".

POSITION 5

At the end of the noise abatement procedure set the Engine Rating Mode switches to FLIGHT and check that the engine rating indicator shows CLB only. Set the Engine Control Schedule selector to NORMAL and check all engines on HI schedule. Advance the throttle levers gently to the required position.

Monitor Nose and Visor operation
Complete the After Take-off Check
Check Yellow system pressure is reducing.

Monitor engine performance and VHF communications. Particular care should be exercised when reading check list that ATC communications are not blocked out.

FLIGHT ENGINEER'S ROUTINE PROCEDURES

POSITION 6

Check Secondary Nozzles begin to modulate at M = 0.55. At M = 0.70 commence rearward fuel transfer.

At Transition Altitude check Altimeters set to Standard Setting and at each re-clearance the cleared Altitude/Level is reset in the Altitude Select Window.

POSITION 7

If the initial or complete cruise is to be subsonic stop the rearward transfer of fuel when the CG reads 55%.

At each 10,000 ft, an altimeter check, a CG check, a pressurisation check and where practicable, a panel scan, must be carried out.

POSITION 8

Acceleration:-

For a straight out acceleration/climb, at M = 0.93:

- select Reheats On in symmetrical pairs.
- start the stop clock for Reheat timing.
- ensure rearward fuel transfer continues satisfactorily.

To begin an acceleration from subsonic cruise:

- set up maximum climb power (dry).
- select Reheats On in symmetrical pairs.
- start the stop clock for Reheat timing.
- re-start rearward fuel transfer.

The Transonic Check is commenced and progressed throughout the climb.

As the Mach No. increases the CG should be monitored and maintained within the corridor.

Monitor intake ramp movement from M = 1.3 upwards.

POSITION 9

At M = 1.7 or, if 15 minutes has elapsed since selection, select Re-heat Off in symmetrical pairs.

POSITION 10

At M = 1.95 select Cruise Rating and check engine rating indicator shows CRS only. Complete the Transonic Check.

Set Load Limits for emergency forward transfer of fuel. Set Throttle Lever Angle indices to 18°.

During the Cruise/Climb maintain optimum CG for performance and adjust lateral trim by use of the fuel system.

Monitor CG, T.A.T., speed, engines and intake performance: panel scan (excluding legs) at regular intervals.

At the nominated waypoints record fuel on board and complete fuel section of Flight Log. At the nominated fuel check point, cross check the fuel to destination with the Cruise Control Manual, and enter fuel and weight data on the landing card.

(Unchanged)

FLIGHT ENGINEER'S ROUTINE PROCEDURES

Monitor the INS in accordance with Nav. Manual Procedures.

Obtain weather as requested.
Record instrument readings as required.
Monitor ATC clearances and instructions, and on No.1 VHF 121.5 MHz.
Study arrival procedures for destination.

POSITION 11

Shortly before deceleration and descent, reset fuel load limits and recheck setting of Throttle Lever Angle Bugs.

Obtain terminal weather and transmit company message if required.

POSITION 12

On command, retard throttle levers slowly to bug setting. Whenever the throttle levers are moved above M = 1.3 monitor the Intake performance.

Commence Deceleration and Descent Check.

Switch off Tank 11 electric pumps and commence forward transfer of fuel. Monitor Mach/CG corridor.

At M = 1.6 retard throttle levers to 34°.

At each 10,000 ft, during descent an Altimeter Check, a CG check, a pressurisation check and where practicable a panel scan must be carried out.

At each reclearance, check new level/Altitude is set in the Altitude Select Window.

POSITION 13

At M = 1.0 (or before descent if cruise has been subsonic) complete Deceleration and Descent Check.

Set throttle levers as required. (Idle permissible).

Check ATIS.

POSITION 14

Ensure QNH set at Transition Level.

Monitor ATC instructions and clearances: assist in monitoring flight instrument displays and radio aids.

POSITION 15

Carry out Approach and Landing Check. Know decision height and go-around procedure. Call, "Radio Altimeter Active".

POSITION 16

At the Outer Marker check height.

Call 1,000 ft Radio Altimeter height and check four greens, nose and visor down, all flags clear, and go-around altitude set. Scan forward engine instruments.

POSITION 17

On final approach, call Radio Altimeter height of 500, 400, 300, 200, 100, 50, 40, 30, 20 and 15 between each 100' call monitor N_2s.

FLIGHT ENGINEER'S ROUTINE PROCEDURES

POSITION 18

Check throttles are fully closed and that the Reverse lights operate correctly (verbal confirmation not required).

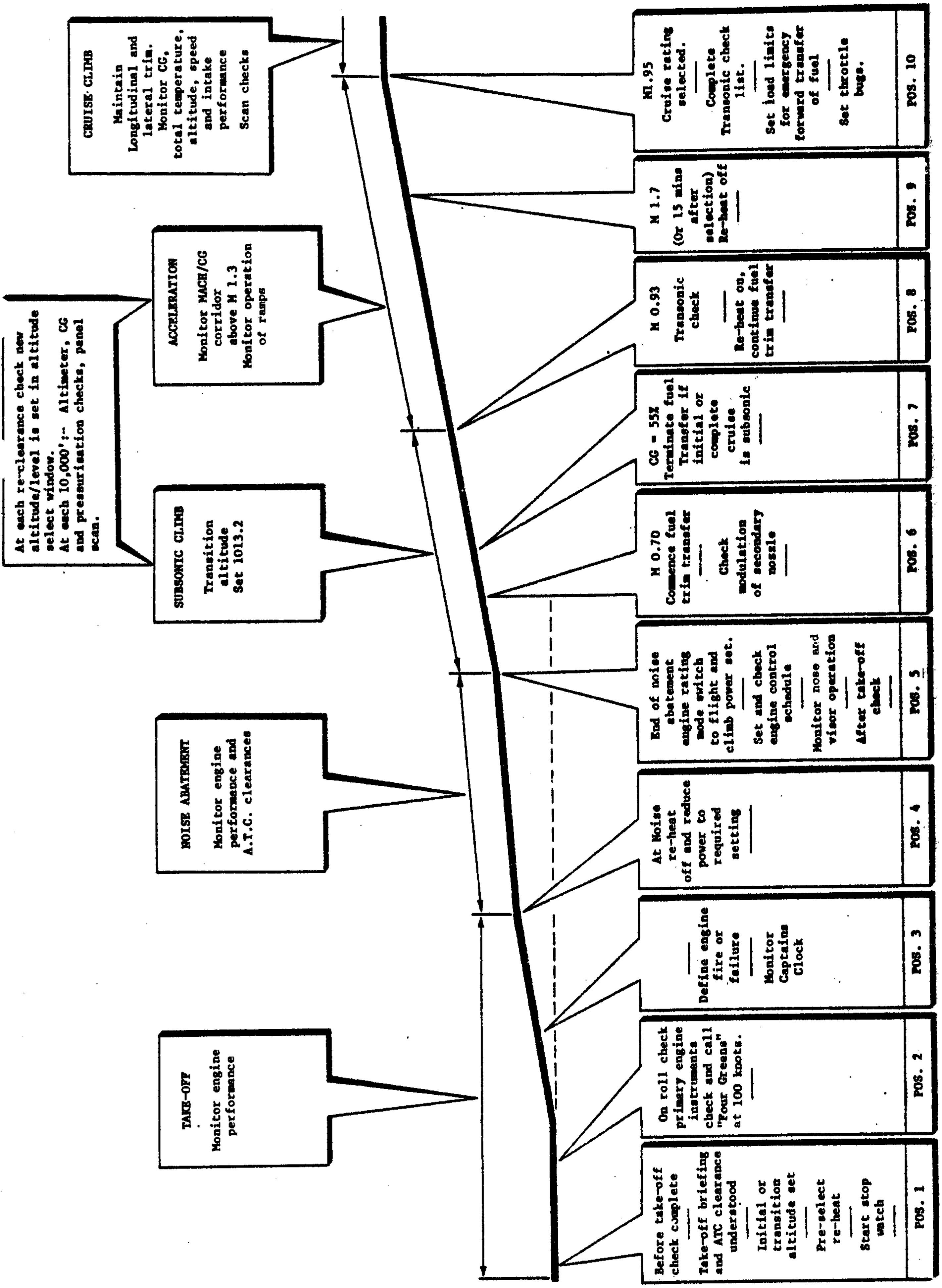
POSITION 19

Monitor engine performance during reverse operation. When clear of runway and when at taxiing speed complete the After Landing Check, shut down inboard engines if systems status permits.

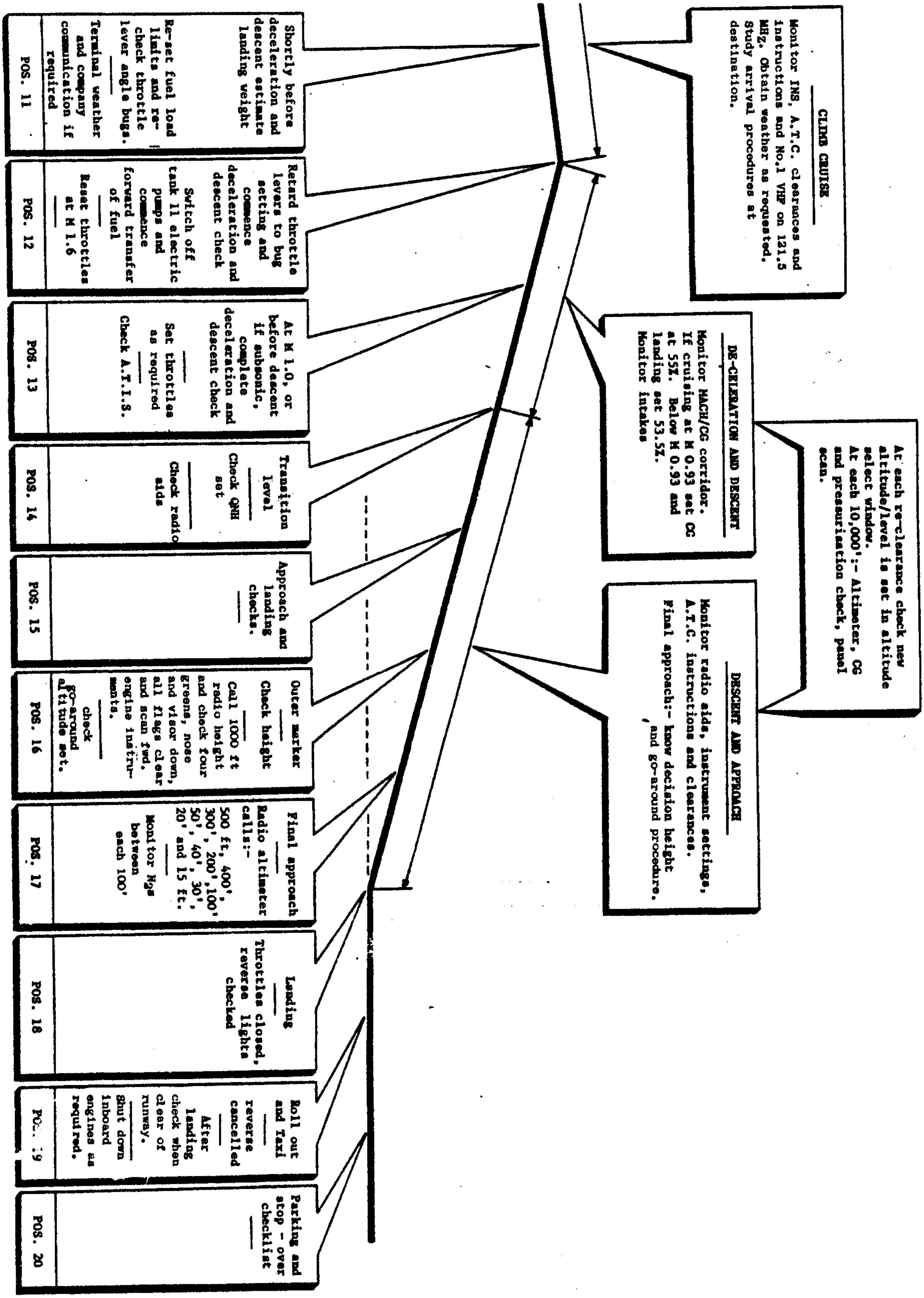
POSITION 20

Complete Parking Check and, if required, Stopover Check.

FLIGHT ENGINEER'S ROUTINE PROCEDURES


TAKE-OFF
Monitor engine performance
NOISE ABATEMENT
Monitor engine performance and A.T.C. clearances
SUBSONIC CLIMB
Transition altitude Set 1013.2
At each re-clearance check new altitude/level is set in altitude select window.
At each 10,000':- Altimeter, CG and pressurisation checks, panel scan.
ACCELERATION
Monitor MACH/CG corridor above M 1.3 Monitor operation of ramps
CRUISE CLIMB
Maintain Longitudinal and lateral trim. Monitor CG, total temperature, altitude, speed and intake performance
Scan checks
Before take-off check complete
Take-off briefing and ATC clearance understood
Initial or transition altitude set
Pre-select re-heat
Start stop watch
POS. 1
On roll check primary engine instruments check and call "Four Greens" at 100 knots.
POS. 2
Define engine fire or failure
Monitor Captains Clock
POS. 3
At Noise re-heat off and reduce power to required setting
POS. 4
End of noise abatement engine rating mode switch to flight and climb power set.
Set and check engine control schedule
Monitor nose and visor operation
After take-off check
POS. 5
M 0.7D Commence fuel trim transfer
Check modulation of secondary nozzle
POS. 6
CG - 55% Terminate fuel Transfer if initial or complete cruise is subsonic
POS. 7
M 0.93 Transonic check
Re-heat on, continue fuel trim transfer
POS. 8
M 1.7 (Or 15 mins after selection) Re-heat off
POS. 9
M1.95 Cruise rating selected.
Complete Transonic check list.
Set load limits for emergency forward transfer of fuel
Set throttle bugs.
POS. 10

FLIGHT ENGINEER'S ROUTINE PROCEDURES



CLIMB CRUISE

Monitor INS, A.T.C. clearances and instructions and No.1 VHF on 121.5 MHz. Obtain weather as requested. Study arrival procedures at destination.

POS. 11

Shortly before deceleration and descent estimate landing weight

Re-set fuel load limits and re-check throttle lever angle bugs.

Terminal weather and company communication if required

POS. 12

Retard throttle levers to bug setting and commence deceleration and descent check

Switch off tank 11 electric pumps and commence forward transfer of fuel

Reset throttles at M 1.6

DE-CELERATION AND DESCENT

Monitor MACH/CG corridor. If cruising at M 0.93 set CG at 55%. Below M 0.93 and landing set 53.5%. Monitor intakes

POS. 13

At M 1.0, or before descent if subsonic, complete deceleration and descent check

Set throttles as required

Check A.T.I.S.

At each re-clearance check new altitude/level is set in altitude select window. At each 10,000':- Altimeter, CG and pressurisation check, panel scan.

POS. 14

Transition level

Check QNH set

Check radio aids

DESCENT AND APPROACH

Monitor radio aids, instrument settings, A.T.C. instructions and clearances. Final approach:- know decision height, and go-around procedure.

POS. 15

Approach and landing checks.

POS. 16

Outer marker

Check height

Call 1000 ft radio height and check four greens, nose and visor down, all flags clear and scan fwd. engine instruments.

check go-around altitude set.

POS. 17

Final approach

Radio altimeter calls:- 500 ft, 400', 300', 200', 100' 50', 40', 30', 20' and 15 ft.

Monitor N_2s between each 100'

POS. 18

Landing

Throttles closed, reverse lights checked

POS. 19

Roll out and Taxi

reverse cancelled

After landing check when clear of runway.

Shut down inboard engines as required.

POS. 20

Parking and stop - over checklist

FLIGHT ENGINEER'S ROUTINE PROCEDURES

FLIGHT ENGINEER'S IN-FLIGHT DOCUMENTATION

1. BEFORE STARTING

Extract take-off P7, and Fuel Flow settings from Section 2 of the Cruise Control Manual and insert on the take-off form.

Extract ZFW & ZFCG from loadsheet and use to:-

- set up the ZFW and ZFCG indicators.
- set up the Aircraft Weight Indicator
- extract tank 11 initial supersonic cruise quantity.

Set USABLE fuel on board in Fuel Remaining indicator.

Check Aircraft Weight indication against loadsheet Take-off Weight plus taxi fuel.

On completion of the Radiation Meter check, record the accumulated does in Millirems on the Sector Defect Log page applicable to the projected sector.

e.g. 0 0 0 2 7 . On an SDL page without provision for radiation recording, enter accumulated dose reading in the first Sector Defect block applicable to the projected sector, endorsing the entry as "BEFORE FLIGHT".

2. TAXI AND TAKE-OFF

Note the chocks away and take-off times for insertion on to the Aircraft Movement Signal.

NOTE: Chocks away time is defined as the time when the aircraft first moves with an engine running, whether it is a ground assisted or a taxi manoeuvre.

3. CLIMB CRUISE

A. Aircraft Systems Log

On sectors with a stabilised cruise of approximately 1 hour, complete the headings and log at least the basic engine parameters i.e. N_2, N_1, FF, EGT, A_J, P_7 and TCA, and perform an EGT comparative check as shown in the following table.

On longer sectors, log one set of systems readings where practicable.

EGT Comparative Check

ENGINE NO.	1	2	3	4
DATUM EGT	646	655	650	654
ACTUAL EGT	643	657	662	652
DELTA EGT	-3	+2	+12	-2

From a scan of delta EGTs it can be seen that No.3 engine is hotter. To establish by how much it is hotter, divide the algebraic sum of the other delta EGTs by 3 and compare with the suspect engine i.e. -3+2+(-2) = -3÷3 = -1.

No.3 engine can now be seen to have a comparative rise of 13°.

NOTE 1. On multiple sector aircraft trips, establish a datum EGT during first sector supersonic cruise and carry it forward to each calculation.

2. On 2 sector aircraft trips, compare actual EGTs with previous sector EGT's.

3. Before using a previous sector EGT, consult the Notes to Crew and Maintenance Engineers for details of any maintenance that would invalidate the comparison.

4. Do not compare a supersonic EGT with a subsonic EGT.

B. Fuel Checks

The primary source of fuel quantity measurement is the total Fuel Remaining Indicator except in the case of flowmeter failure or following jettison, when the FQI system is to be used.

Flight logs have spaces for "Fuel to Destination" figures on the same line as the "From" position. These figures are calculated at the flight planning stage and entered in the spaces before flight.

On the first line of the first page i.e. the leg from point of origination to first reporting or waypoint, enter the loadsheet fuel on board for take-off.

Subtract the calculated "fuel to destination" from "loadsheet fuel on board" to give a "Fuel Remaining at Destination" figure.

During subsonic or supersonic cruise, at the nominated fuel check points:

- record fuel on board.
- subtract calculated "fuel to destination" from "fuel on board".
- compare resultant "fuel remaining at destination" with figure obtained on the top line of the flight log first page.

4. AT FUEL CHECK POINT IDENTIFIED "FC" ON FLIGHT LOG

A. Fuel Check

One reporting or way point, normally within 1,000 nms of destination will be identified "FC" in the fuel to destination block. At this point, using the Cruise Control manual, complete an accurate fuel check as follows:-

(Unchanged)

- extract average wind component from fuel flight plan and distance to go from flight log.
- note the SAT, aircraft weight and fuel on board.
- enter the cruise control manual Fuel Check and Flight Re-Planning table with required parameters and extract Fuel Required to destination.

  NOTE: that separate supersonic and subsonic tables exist.
- enter "fuel required" and "fuel on board" in the appropriate flight log columns.
- subtract "fuel required" from "fuel on board".

- compare resultant "fuel remaining at destination" with planned fuel at destination i.e. sum of alternate, contingency and excess fuel.

If the remainder of the flight includes a subsonic cruise:-

- extract wind component from fuel flight plan and subsonic cruise distance from flight log.
- enter the cruise control manual Additional Fuel and Time table with the above parameters and extract fuel and time increments to add to the figures derived from the Supersonic table.
- enter the corrected "fuel required" and "fuel on board" in the appropriate flight log columns and complete the calculations as above.

B. Descent and Landing Data Form

Use the "fuel remaining at destination" derived from the accurate fuel check to complete the Descent and Landing Data Form. Enter the following data:-

- estimated landing weight.
- V_{REF}.
- abnormal increment i.e. increment to V_{REF} due abnormal configuration e.g. no autothrottle.
- target speed i.e. sum of V_{REF} and abnormal increment: this should always be entered even when the abnormal increment is zero.
- fuel at destination.
- diversion fuel and name of alternate.
- holding fuel.

NOTE: That space is available for 2 alternates to be considered.

5. BEFORE APPROACH

Check that the landing weight, V_{REF}, and fuel at destination are still valid.

6. AFTER LANDING

Note the landing and chocks in time for insertion on to the Aircraft Movement Signal.

Note the Fuel Total Contents for comparison with refuel book item B

Record the Radiation Meter accumulated dose on the SDL page applicable to the completed sector e.g. 0 0 0 3 6.

On an SDL page without provision for radiation recording enter the reading below the Pre-Flight radiation count, endorsing the second entry as "AFTER FLIGHT".

Complete the AMS and SDL sections of the Maintenance Log.

FLIGHT ENGINEER'S ROUTINE PROCEDURES

7. MAINTENANCE LOG

A. Aircraft Movement Signal

(1) SERVICE FLT. NO.

Begin in the first space: do not leave an empty space between numbers. Only enter the flight prefix if it is other than BA.

(2) SECTOR/TRIP REF.

SECTOR number is sequential commencing 01 as the first sector ex LHR. If a defect is entered prior to moving off chocks at LHR the sector no. is 00.

TRIP no. is sequential for each trip departing LHR.

For trip no. 1 enter as 0001.

NOTE: The previous no. will be on the SDL page carrying the certification for the projected sector.

(3) CHOCKS AWAY DATE

Example 4th May 1976 = 0 4 0 5 7 6.

(4) DEPARTURE AND ARRIVAL STATIONS

Enter with 3-letter code as per index card.

(5) All times GMT.

(6) SUPERSONIC CYCLES THIS SECTOR

Enter the no. of times the aircraft completes a supersonic acceleration.

Enter 0 for a complete subsonic sector or incomplete acceleration.

B. Sector Defect Log

(1) RADIATION ACCUMULATED DOSE RECORDING

Record the accumulated dose as per instructions in Flight Engineer's IN-FLIGHT DOCUMENTATION para.1. BEFORE STARTING and para.6 AFTER LANDING.

(2) EVERY log entry must be allocated a sequential number during the round trip LHR - LHR.

(3) If more than 4 entries are required, place a cross in the "NEXT PAGE USED" box and continue on the next page set. Only the REGISTRATION and SECTOR/TRIP REF need be completed on second and subsequent page sets. Only the last page set per sector need be signed.

(4) If a special Report Form has been raised endorse the appropriate box accordingly.

C. Cabin Defect Report

When a cabin defect report is raised, place a cross in the CABIN DEFECT REPORT box on the SDL. Enter as a Sector Defect log item, any cabin defect that, in the Flight Engineer's opinion, may adversely affect the safety of the aircraft or personnel.

FLIGHT ENGINEER'S ROUTINE PROCEDURES

D. Technical Memorandum

This page is provided to enable a full amplification of a sector defect to be made. Any entry on this page MUST refer to an SDL item.

8. REFUEL BOOK

On arrival at LHR, record the arrival fuel contents as Refuel Log item B. This record is required for Customs.

9. ITEM

The IFM function of ITEM should be operated and recorded as follows:-

(1) For each unplanned disconnect, of technical significance, note the displayed caption and enter it into the Maintenance Log together with a brief description of A.F.C.S. mode and operation immediately prior to disconnect.

The displayed caption should be left in the window to enable it to pass into the ITEM memory.

A further disconnect will replace the previous caption with the appropriate display.

(2) Should a disconnect of no technical significance occur, clear the display by momentarily selecting CANCEL.

10. USE OF DUPLICATED SYSTEMS

(1) On all outbound sectors, LHR to terminal station use:
- main ECUs
- system 1 pressurisation control
- intake lanes A
- LH igniter for starting.

(2) On all inbound sectors, terminal station to LHR use:
- alternate ECUs
- system 2 pressurisation control
- intake lanes B
- RH igniter for starting.

11. FINAL SECTOR INTO LHR

(1) At some convenient point when subsonic carry out a functional check of the Wing and Intake anti-icing systems. Sector Defect Log entry need only be made if a fault if found.

(2) Contact company on v.h.f. Transmit defect report (including significant ADDs) and any other information as required.

DRILLS AND CHECKLISTS

Crew Duties and Integration - The 3 man operation of the Concorde has been made feasible by, among other things, maximum automation of the system control from the Flight Engineer's panel and by carefully studied and planned layout of all equipment and controls on the flight deck.

Drills and duties have been divided for a standard flight deck crew of three. To achieve optimum safety during the critical phases of each flight - i.e., take-off, initial climb, approach landing and deceleration - the Flight Engineer's function is to face forward to monitor instruments, instrument settings, approach displays, warnings etc as well as to monitor communications, maintain a look-out and to make routine or warning call-outs as a back-up for the First Officer (see Standard Monitoring Cross Checks and Call-outs). During other phases of flight the Flight Engineer must also concern himself with all the aforementioned matters when not actually engaged on system management at his own panel or on other duties that may be allocated to him.

All the pre-flight checks on the flight deck have been divided between the First Officer and the Flight Engineer, thus, after the usual formalities and briefing routines at the check-in office, if it is necessary for one man to stay behind for (say) final checking and signature of the flight plan, this may be the Captain or the First Officer at the former's discretion; the other will proceed to the aircraft to perform the pre-fligh checks.

In flight form filling, instrument log keeping and such like paper work must be kept to a minimum and restricted to the en route phases of flight. Other log keeping must not be allowed to interfere with the safety of the operation.

All Concorde Flight Engineers hold R/T licences and can handle routine Company communications, copy clearances and receive weather broadcasts as may be requested by the pilots. In addition they will tune and identify navigation radio aids if instructed.

2 Man Operation (in the event of incapacitation of one crew man is also perfectly feasible.

Standard Procedures - The only satisfactory means of achieving complete co-ordination is through the use of Check Lists, standard cockpit commands and terminology. All check lists are to be read aloud, except that routine items allocated to the Flight Engineer only may be performed silently.

After the Flight Engineer has carried out the SAFETY CHECKLIST he will provide ground power, then complete the PRELIMINARY COCKPIT CHECKLIST which sets the systems, ready for the scan checks.

The First Officer will read the BEFORE START CHECKLIST, PUSHBAC CHECK and the AFTER START CHECKLIST. All other checklists will be read by the Flight Engineer.

C = Captain; P = First Officer; E = Flight Engineer
G = Ground; S = Senior Cabin Crew Member; ALL = C.P.E.

(Unchanged)

DRILLS AND CHECKLISTS

Scan Checks - No Check List is provided for the initial external and internal checks which will be covered by the systematic scan check method. Similarly many routine items not relevant to the safety of the passengers, crew or aircraft have been omitted from the Normal Check Lists. At transit stops or short turnarounds a full scan preflight check must always be carried out but there is obviously no need to test those pieces of equipment known to be serviceable on arrival.

Call and Response - The Captain will call for the appropriate check list when required and shall not assume that it will be read automatically; the check list reader must ensure that all checks have been carried out. The Captain should also ensure that he receives the report indicating that the check has been completed. Instances may arise where it becomes necessary to deviate slightly from standard drills in order to conduct the flight in a more efficient and safe manner. Captains should use their best judgement in effecting these temporary deviations.

Emergency/Abnormal Checklist Procedures

General

Any crew member detecting an existing or impending emergency/ abnormal condition will immediately inform the Captain.

Where the pilot in charge feels that safety can be enhanced by enlisting the help of other qualified personnel on the flight deck, he should issue clear and concise commands for what he requires of them. Well intentioned but unco-ordinated actions by other crew members may well aggravate the situation. If an emergency should arise during the absence of the Captain he should be summoned to the flight deck by the best means available. In the last resort the public address system may be used.

WHENEVER AN EMERGENCY OR ABNORMAL PROCEDURE IS BEING CARRIED OUT, ONE PILOT MUST CONTINUOUSLY MONITOR THE AIRCRAFT'S FLIGHT PATH.

Emergency Checklists

On the Captain's command the appropriate crew member(s) will REPEAT THE EXECUTIVE COMMAND AND THEN perform without reference to the checklist those items above the dotted line.

Memory items should be completed, each crew member calling aloud the action he is about to take. Where possible actions should be monitored by other crew members.

The Flight Engineer will then read the complete checklist to confirm that memory items have been actioned, and check that th appropriate crew member(s) take the correct action for those items below the dotted line.

The checklist may be read silently except,

- when the correct memory action has not been taken.
- when the correct memory action cannot readily be visually confirmed by the Flight Engineer.

In the above cases the Flight Engineer must challenge the appropriate crew member and confirm correct response and action.

DRILLS AND CHECKLISTS

Items below the dotted line which require action by another crew member must be read aloud and the correct response and action confirmed.

Whenever an Emergency is called for that drill must be COMPLETED before any other drill is started even though another condition develops prior to its completion.

Upon completion of the Checklist the Flight Engineer will announce "....... Checklist completed."

Abnormal Checklists

On the Captain's command, the Flight Engineer will read the appropriate checklist.

The "E only" checklist items may be read silently. Items which require action by another crew member must be read aloud and the correct response and action confirmed.

Upon completion of the checklist, the Flight Engineer will announce, "....... checklist completed."

Absence from Flight Deck - The Check List folders shall be kept readily available.

For phases of flight when it is permissible for one of the three technical crew members to leave the flight deck for short periods, the emergency or abnormal procedures will be completed by two men. The First Officer will cover the Captain or Flight Engineer actions and the Captain will cover those allocated to the First Officer.

The Flight Engineer's leaving Panel Check should be carried out whenever the Flight Engineer leaves the flight deck.

TEMPORARY REVISION
(Continued)

NOTES:

1. The winds referred to in the table overleaf are meteorological mean winds, (e.g. in the case of a reported "30 kt gusting 45 kt", the mean wind is 30 kt).

2. Reduced Noise Approach V_{TT} = V_{REF} + 7 kts + wind increment as appropriate. V_T MAX = V_{REF} + 10 kts.

3. The 7 kt increment added to V_{REF} for the autothrottle inoperative case is required for handling considerations. The wind increment is therefore added to the 7 kt increment to provide an adequate margin above V_{REF} + 7 kt.

4. The 5 kt increment added to V_{REF} for the 3 engines operating case is to improve the landing WAT limited weight, rather than for handling considerations. As windspeeds above 15 kt require a V_{REF} increment in excess of 5 kt, the wind and WAT weight increments are not additive.

5. Above 300 ft., the target approach speed on 2 engines is V_{REF} + 30 kts and this is set on an external index.

Target speed (V_{TT}) for the following configurations is V_{REF} + 10 kts
An appropriate increment for wind may be added, up to V_T max of V_{REF} + 17 kts with or without autothrottle.

Both electric trim systems lost.

Both pitch auto-stab systems lost.

Flying Controls in mechanical mode.

Both flying control inverters lost.

VLA - From top of descent to FL 400 an external index should be set at 300 knots.

From FL 400 to FL 150 it should be set at 250 knots (Below FL 150 VLA = V_{REF}).

TEMPORARY REVISION
Insert facing 08.04 page 01

REASON FOR ISSUE:

To incorporate Flight Manual changes.

ACTION:

ASI INDICES

Take-Off - Set the internal index at V_2. Set the external indices at V, V_R, and V_2 + 40 knots.

Landing - Set the internal index at the target speed (V_{TT}).

Set the external indices at V_{REF}, Max Threshold Speed (V_T Max), V_{REF} + 30 (minimum 190 knots) and 250 knots.

Reference Landing Approach Speed (V_{REF}) - The reference landing approach speed is the target speed for final approach and crossing the threshold for the all engines, light wind, low turbulence, autothrottle engaged case.

Target Threshold Speed (V_{TT}) - This is the speed to be used in the latter stages of the approach, and at which the pilot should aim to cross the threshold. For the particular aircraft and atmospheric conditions given in the definition of V_{REF} above it is equal to V_{REF}. For other conditions the speed increments given in the table below must be added to V_{REF}.

Maximum Threshold Speed (V_T MAX) - This is the speed at the threshold above which the risk of exceeding the scheduled landing field length is unacceptably high. If it appears certain that the speed at the threshold will exceed the maximum threshold speed and the runway available is known to be critical, the attempt to land should normally be abandoned.

In cases where V_{TT} is at or close to V_T MAX transient speed excursions above V_T MAX can be accepted.

SPEED INCREMENTS ABOVE V_{REF}

AIRCRAFT CONFIGURATION	INCREMENT TO BE ADDED TO V_{REF} TO GIVE ← V_{TT} →			V_T MAX
	WIND 0 - 15 kt	WIND 15 - 30 kt	WIND Above 30 kt	
4 ENGINES OPERATING	0	1/3 WIND SPEED	10 kt	10 kt
3 ENGINES OPERATING	5 kt	1/3 WIND SPEED	10 kt	10 kt
2 ENGINES OPERATING (Autothrottle) (not allowed)	7 kt	7 kt PLUS 1/3 WIND SPEED	17 kt	17 kt
NO Autothrottle 3 or 4 ENG.	7 kt	7 kt PLUS 1/3 WING SPEED	17 kt	17 kt

(Continued)

ASI INDICES

Take-Off - Set the internal index at V_2. Set the external indices at V_1, V_R, and V_2 + 40 knots.

Landing - Set the internal index at the target speed (V_{TT})

Set the external indices at V_{REF}, maximum threshold speed, V_{REF} + 30 (minimum 190 knots) and 250 knots.

Target Speed (V_{TT}) - For winds not in excess of 15 knots these are:-

Four engines with autothrottle	V_{REF}
Four engines without autothrottle	V_{REF} + 7 knots
Three engines with autothrottle	V_{REF} + 5 knots
Three engines without autothrottle	V_{REF} + 7 knots
Two engine	V_{REF} + 7 knots

NOTE

Above 300 feet, the target approach speed on two engines is V_{REF} + 30 knots and this is set on an external index.

Both electric trim systems lost	V_{REF} + 10 knots
Both pitch autostab systems lost	V_{REF} + 10 knots
Flying controls in mechanical mode	V_{REF} + 10 knots
Both flying control inverters lost	V_{REF} + 10 knots

Maximum Threshold Speed - This speed is independent of the number of engines operating and is:-

With autothrottle	V_{REF} + 10 knots
Without autothrottle	V_{REF} + 17 knots

V_{LA} - From top of descent to FL.410, an external index should be set at 300 knots.

From FL.410, to FL.150, it should be set at 250 knots. (Below FL.150 $V_{LA} = V_{REF}$).

ALTIMETER SETTING PROCEDURES

		Barometric		Radio
		Subscale	External Index	Internal Index
Take-off		Airfield QNH	Airfield Elevation	20 Feet
Climb) Cruise) Descent)		ATC setting	N/A	N/A
Approach Check	(a) CAT 2 or CAT 3 Approach	Airfield QNH	QNH Decision Height ILSH	Tabulated RA Decision Height
	(b) ILSC Approach	Airfield QNH	QNH Decision Height (if not listed set ILSH QNH DH)	Tabulated RA Decision Height (If not listed set HAT)
	(c) Other IFR approaches	Airfield QNH	QNH Decision Height	300 Feet
	(d) VFR Approach	Airfield QNH	QNH Decision Height	300 Feet

NOTES:

(1) All subscale readings and minima settings must be cross-checked at the time of setting.

(2) For autoland with minima below 200 ft i.e. category 2 or 3, the Radio Altimeter DH will always be the overriding Decision Height. The pressure altimeter bug should be set to the appropriate ILSH DH QNH to provide a reference for manual reversion.

(3) In Category 1, the DH RA will be the Decision Height where published, otherwise the DH QNH becomes the Decision Height and the HAT set on the radio altimeter is advisory only.

(4) If an aircraft is passed a height clearance - based on QFE, request must be made for an altitude based on QNH.

(Deletion)

Continued......

ALTITUDE SELECTOR SETTING PROCEDURE

The non handling pilot will set in sequence on command (as appropriate during the climb and descent) in the A/P - F/D altitude selector:-

(a) the altitude clearance limit

(b) the flight level clearance limit

(c) the go-around altitude limit when crossing the outer marker on final approach.

THIS SETTING MUST BE CHECKED AND CONFIRMED AS CORRECT BY THE HANDLING PILOT ON ALL OCCASIONS.

(Unchanged)

MONITORING AND CALLOUTS

Crew Integration - Safety demands that Concorde is operated strictly in accordance with recommended procedures and techniques, varied only as dictated by common sense and airmanship, having regard to all the circumstances prevailing. The occupants of the pilots' and Flight Engineers seats must operate as an integrated crew, monitoring and cross checking each others' actions in so far as is practicable. Duties may be delegated by the Captain to supernumerary or u/t crew members in accordance with their qualifications and they should also assist in monitoring the operation generally.

Commands - In order to avoid any possibility of error or misunderstanding all commands given on the flight deck must be repeated back in the acknowledgement.

e.g. CAPTAIN ... "Gear Up". FIRST OFFICER ... "Gear Up".

Without superfluous wording, direct attention precisely to the item to be changed by first naming the item and second the desired value e.g. "Visor Down", Nose 5°".

Use of Radio Aids - The switching of radio information to HSI, Autopilot and Flight Director can lead to confusion or error if adequate liaison between pilots is not maintained. Navigation facility frequency changes must be announced including confirmation of station identification and correct frequency. The final approach aid must be identified by both pilots.

The transfer switches will only be operated in the event of equipment unserviceability.

Monitoring - The navigation and flight progress indications must be cross-checked and monitored continuously; any crew member must advise the Captain immediately if:-

(1) it appears that the aircraft is departing significantly from its intended flight path OR

(2) any abnormal instrument indications, comparator, caption, flag or light warnings are observed.

Altimeters - Barometric altimeters and subscale settings will be cross-checked at each 10,000 ft level on climb and descent.

The Flight Engineer will participate in altimeter monitoring and to this end must listen to ATC clearance and familiarise himself with safety heights, transition altitudes, levels and met minima as appropriate.

Radio Altimeters - The radio altimeters must be monitored by both pilots at all times that they are active - i.e. below 2500 ft AGL.

Responsibilities - During the take-off, climb and approach to land phases of flight, the non-handling pilot and Flight Engineer will be responsible for monitoring and cross-checking the flight instruments and calling out appropriate information - the ensuing list covers the more important items under these headings. The FE should not call the bracketed call-outs unless omitted by the Co-pilot. On final approach it is vitally important that the non-handling pilot continues to monitor the aircraft's flight path by reference to the instruments, even after becoming visual, until the threshold has been crossed.

(Unchanged)

MONITORING AND CALLOUTS

CG - CG position should be stated by CP & E at the following points:-

(1) Every 10,000 ft altimeter check.

(2) All check listed speed triggers.

(3) At completion of fuel trim transfer operations.

NOTE: When fuel is being transferred in flight for Pitch or Roll trimming the Captain must be informed.

MONITORING AND CALLOUTS

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Pre Take-Off	Pre-Start	Pressure Altimeters	Both QNH Indicating Elevation				
		Trim	Check set for Take-Off				
		ASIs	Indices Set				
		Pitch Indices	Check set for Take-Off				
Take-Off	Roll	ASIs	Both Registering 'P' Only	"Airspeed Building"		X	
		ASIs -100 kts		"100 kts"		X	
		Power Check	4 lights		"Power Checked"	X	
					or "Engine Failure"		X
		ASI-V_1		"V_1"		X	
		ASI-V_R		"Rotate"		X	
		ASI-V_2		"V_2"		X	
	Initial Climb	Rad. Alt Climbing 20'		"Positive Climb"		X	
		240 knots		"240"		X	
		Noise Abatement		"3-2-1 NOISE"	(NOISE)	X	
		ASI Decaying to or below min		"Airspeed"			X
		VSI negative R.O.C.		"Rate of Climb"			X
		ADI Bank Angle ±2° from specified		"Bank Angle"			

MONITORING AND CALLOUTS

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Climb	Every 10,000 feet	Altimeters	Subscale & Readings CG indication	"Altimeter Check" & CG	"Altimeter Check" & CG	X	
	When Altimeter setting changes	Altimeters	Subscale & Readings	"Transition Altitude"	"Transition Altitude"	X	
	Setting cleared Height	Altitude Select	Correct Height Set	"Cleared Altitude set"	"Cleared Altitude set"	X	
	Approaching Cleared Altitude	Altimeter		"1000 ft to Go"	"1000 ft to Go"	X	
Descent	Every 10,000 feet	Altimeters CG	Subscale & Readings C G. Indication	"Altimeter Check" & CG	"Altimeter Check" & CG	X	
	At 10,000 ft (or FL.100)	Altimeter	Subscale & Readings			X	
	Setting Cleared Height	Altitude Select	Correct Height Set	"Cleared Altitude Set"	"Cleared Altitude Set"	X	
	When Altimeter Setting changes	Altimeter	Subscale & Readings	"Transition Level"	"Transition Level"	X	
	Approaching Cleared Altitude	Altimeters		"1,000 ft to Go"	"1000 ft to Go"	X	

MONITORING AND CALLOUTS

(Unchanged)

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Approach	Approach Check	ASIs	Indices Set				
		Pressure Altimeter	Index set to QNH DH				
		Pressure Altimeters	QNH Set Alts Agree				
		Radio Altimeters	DH Pointer Set				
		Radio Altimeter	Radio Altimeter		"Radio Altimeter Active"	X	
	Final Approach	HSI Beam Bar Off Stop		"Beam Bar Active"	("Beam Bar Active")	X	
		HSI Glide Bar		"Glide Slope Active"	("Glide Slope Active")	X	
		HSIs	Beam and G/S Bars Agree Both Sides				
		GPWS audio "Glideslope"		"Glideslope"		X	
	At O.M.	Altimeters	Instruments	"Height Checks"		X	
	At 1000 ft RA	Radio Altimeter			"1000 ft radio"	X	
		ALTITUDE SELECT	Go-around altitude set	"Go-around altitude set"	("Go-around) (altitude set")	X	
		Nose /Visor & Landing Gear	Fully down Down & Locked	"5 greens" (1 nose & 4 gear)	("5 greens")	X	
		W&LD	Category Status	"Cat 1, 2 or 3" (autoland only)	("Cat 1, 2 or 3")	X	
						X	

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
		CAT 1 DH + 100 DH		"100 to Go" "Decision Height"	("100 to Go") ("Decision Height")		
		CAT 2 & CAT 3 300 Radio DH + 100 Radio DH		"Alert Height,cat.." "100 to Go" "Decision Height"	("Alert Height,cat..") ("100 to Go") ("Decision Height")		
Approach	Final Approach Below 1000ft.	VASIS Indicate too high or low		"VASIS"			X
		VSI Excess 1000 F.P.M.		"Rate of descent"			X
		I.A.S. Near Min, Decaying Rapidly, or Approaching Max. Threshold Speed		"Airspeed"			X
		H.S.I. Beam Bar Exceeds 1 Dot Deflection		"Beam Bar"			X
		H.S.I. Glide Slope Exceeds 1 Dot Deflection		"Glide Slope"			X
		Radio Altimeter Reading			"800', 500', 400', 300', 200', 100', 50, 40, 30, 20, 15."	X	
	Flare	ADI, Pitch Attitude exceeds 12.5°		"Attitude"			X

(Unchanged)

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Approach: additional items applicable to Reduced Noise Approach only.		Radio Altimeter AFCS	IAS ACQ selected		**"800 ft"**	X	
		Radio Altimeter ASI, AT & HSI glide bar		"Stabilised"	**"500 ft" ("Stabilised")**	X	
		Radio Altimeter AFCS control panel		"Autopilot" (if AP or FD still engaged)	**"300 ft" ("Autopilot")**	X	

MONITORING AND CALLOUTS

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Missed Approach	Initial Climb	V.S.I - Climb		"Positive Climb"		X	
		A.S.I Decaying or below min.		"Airspeed"			X
		V.S.I. Negative R.O.C.		"Descending"			X
Landing	Deceleration	A.S.I. 100 knots		"100 knots"		X	
		75 knots		"75 knots"		X	
		HSI Ground Speed 40 knots		"40 knots"		X	
		20 knots		"20 knots"		X	
All Phases as appropriate		ADIs Excessive Roll or Pitch		"Bank Angle" "Pitch Attitude"			X X
		Altitude Alert Tone and/or light		"Altitude Alert"	"Altitude Alert"	X	X
		G.P.W.S. Pull-up lts (pre-mod, Terrain) plus audio "Pull-up".		"PULL-UP" Warning"			X

CREW BRIEFING

Reasons - In the interests of mutual understanding, co-ordination and safety of operation some form of crew briefing by the pilot is considered necessary prior to take-off and also before the approach and landing. The expression 'normal briefing' indicates that normal drills as laid down will be followed but special consideration must be given:-

In the take-off briefing to:-

(a) Cross wind on the runway.

(b) Anti-icing.

(c) Special ATC clearance considerations including setting of radios.

(d) Noise abatement.

(e) Brief review of the abandoned take-off drill.

(f) Transition Altitude.

In the approach briefing to:-

(a) Expected instrument procedure to be followed including use of radios and appropriate company minima. Specific mention should be made of glide-path restrictions when the appropriate ILS is asterisked in the minima.

(b) Missed approach procedure, including pattern to be followed, use of radios and the go-around drill.

(c) Review of pertinent information concerning runway length, turn off points and surface conditions. The serviceability of approach aids, approach and runway lighting and marking should also be reviewed.

(d) Special consideration of any emergency or unusual aircraft or system configuration.

(e) Type of approach procedure and associated drills and monitoring, e.g:- Reduced Noise Approach with or without autopilot, All Weather Approach with or without autoland.

(f) Special briefings for Category 2 or 3 operations.

(g) Transition level.

NOTE: Additional approach briefing will be required in the event of:-

(a) Change from the expected approach procedure or

(b) System failures which affect the landing (e.g. autothrottle).

(c) Change of runway in use.

TAXIING

Rudder Trim - In order to centralise the rudder pedals, the rudder trim should be set to zero before taxiing.

Taxy Power - As fairly high power settings (up to 80% N_2) may be needed to start the aircraft moving when heavy, the area behind the aircraft should be clear before the aircraft is moved under its own power.

Once the aircraft is moving, idle power provides more than enough thrust to keep the aircraft rolling, even at high weight. After landing it is normally recommended to shut down the two inner engines for taxiing.

The use of LO idle is recommended when idle power is providing more than enough thrust to keep the aircraft moving.

Nose and Visor - The recommended procedure is to have the visor down and the nose at 5° for taxiing.

Ensure that ground equipment is clear before lowering the nose.

Braking - When the aircraft is moving, do not move the brakes lever while the brake pedals are depressed.

Continuous braking should be avoided during taxing; it is preferable to use a few smooth firm applications. Continuous braking will result in high brake temperatures.

Pilot's Position - The pilot's position is 38 feet forward of the nose wheel and 97 feet from the main wheels. Care and judgement are needed to make sure that the main wheels stay on the taxiway during turns.

Should there be any doubt about clearances, or wheel position, the DV window should be opened and a visual check carried out (wing tips and all wheels can be seen).

During a minimum radius turn, the wing tip tracks inside the nose but the tail tracks outside the wing tip.

Steering - Steering is normally accomplished with the nosewheel tiller but limited directional control is available using rudder pedal steering.

The rudder/nosewheel interlink makes it essential to hold the tiller during the pre-flight check of the rudder.

If the nosewheel fails whilst taxiing, use differential braking to steer the aircraft. Do not attempt to reset nosewheel steering until below 5 knots.

Ground Speed - INS ground speed must be monitored during taxiing and a maximum of 10 knots observed before entering sharp turns. However, speed should not be allowed to become so low that large thrust applications are required in confined spaces where jet blast should be considered.

180° Turn - A 180° turn can be carried out on a 150 feet wide dry or wet runway provided that the following procedure is adopted. The aircraft ground speed should be between 5 knots minimum and 10 knots maximum. Steer 20 degrees, left or right, from the runway axis. When the pilots seat is plumb over the edge of the runway turn the nosewheel steering handle to full deflection. The nosewheel will not be nearer than 8 feet from the edge of a 150 feet wide runway during a complete 180° turn.

CAUTION: ON A DRY SURFACE DO NOT APPLY BRAKING ON THE INSIDE OF THE TURN WITH FULL NOSEWHEEL DEFLECTION AS THIS COULD RESULT IN LANDING GEAR OVERLOADING.

ON A WET SURFACE GENTLE BRAKING ON THE INSIDE OF THE TURN IS ALLOWED AND IS SOMETIMES NECESSARY TO HELP IN COMPLETING TIGHT TURNS ON WET SURFACES PARTICULARLY AT VERY AFT CG POSITIONS.

Nosewheel Deflector Clearance - The nose wheel deflector ground clearance can be less than two inches depending on tyre compression which is affected by normal considerations such as braking, or turns or surface irregularities. Care is therefore necessary in manoeuvres that bring the nose wheel close to projections above the runway or taxiway surface. 180 degree turns should be limited to runways of 200 feet width or greater to protect the deflector.

The deflector should be inspected after any take-off rejected above 100 knots.

Reverse - Reverse thrust will not be used to back the aircraft.

CG - When starting to taxi with a standard fuel loading, the payload distribution, although quite correct, is likely to be such that fuel transfer is necessary to achieve the recommended CG position for take-off. The relevant figures for pre-take-off transfer, or pre-take-off burn off from tank 11 are given in the loadsheet. The procedure is to achieve the finak tank 11 contents as shown on the loadsheet and accept the indicated CG position provided that it is within ± 0.3% of the required figure.

When taxiing with fuel loads in excess of the 53.5% Co MAXIMUM TAKE-OFF FUEL, it is recommended that nosewheel steering angles are limited to half deflection of the steering handle on dry surfaces and approximately quarter deflection on wet surfaces. If the response to nosewheel steering demands proves to be insufficient, differential braking will be effective in providing the additional directional control.

It is also recommended that the taxiing speed be limited to a maximum of 20 kt true groundspeed.

Take-off must not be attempted with Mach/CG position warning light on.

(Unchanged)

Trim - The take-off trim setting is dependent only on CG position and varies linearly from 2.5° nose down, to 0.5° nose down between CG position of 53.5 and 52.5% Co. At the take-off maximum aft CG position of 54% the trim is 2.5° nose down.

The trim setting should be checked on both the pitch trim indicator and the flight control position indicator.

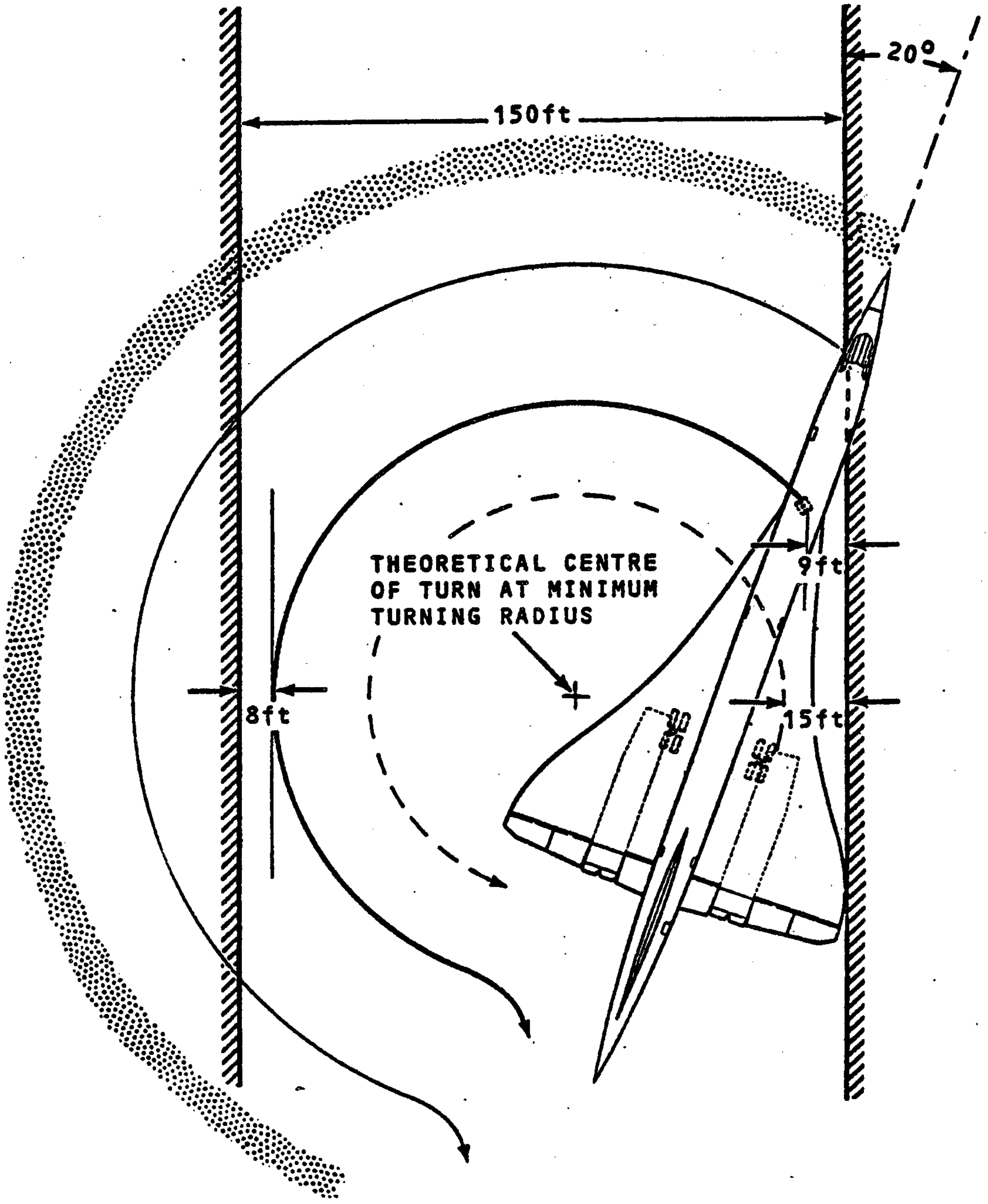
For optimum performance, the recommended CG position at weights of 140,000 Kg and above, is 53.5% Co. The take-off trim setting for these weights is therefore 2.5 nose down.

To avoid transient CG warnings the recommended CG position at weights below 140,000 Kg is 53% Co. The take-off trim setting for these wieghts is therefore 1.5° nose down.

TAXIING

NOTE:

60° IS MAXIMUM POWERED STEERING ANGLE
3° SLIPPAGE HAS BEEN ASSUMED TO OCCUR
GIVING AN EFFECTIVE ANGLE OF 57°



TAKE-OFF AND INITIAL CLIMB

Differences - Main Differences on take-off compared with other aircraft are:-

(1) Reheat is used.

(2) Initial climb out performance increases rapidly with increasing speed.

(3) Contingency power is selected after engine failure. Speed and sideslip must be carefully monitored to achieve maximum performance.

(4) The tyres are very close to their maximum speed on lift off.

(5) Although the criterion $V_2 \geqslant 1.2$ vs has been generally adequate for conventional aeroplanes for Concorde it is necessary to prescribe separately:-

  (a) $V2 \geqslant 1.125\ V_{ZRC}$ (performance margin)

  (b) $V2 \geqslant 1.2\ V_{MIN}$ 1G (incidence margin)

  (c) Manoeuvre capability at $V_2 \geqslant 1.45$ G

Nose and Visor - The nose must be in the 5° position for take-off.

Take-Off - All take-offs should be regarded as instrument manoeuvres from the point of rotation.

The aircraft should be held on the footbrakes at the end of the runway with the engines at idle power, the rating mode switches at TAKE-OFF and reheat pre-selected.

The brakes are released, and stop watches started at the time the throttles are advanced from idle to achieve take-off power. It is essential that the brakes are fully released before thrust is applied.

Rolling Take-Off - A rolling take-off is permissible if the available distance exceeds the required distance by 60 metres or more. In this case the engines are rapidly accelerated as the aircraft is turned onto the runway, ensuring that the required power is selected within 4 seconds. Stopwatches are started at the time the throttles are advanced from idle to achieve take-off power.

100kt Check - At 100 knots 4 'clear to go' lights should be illuminated. However it is permissible to continue the take-off if one 'clear to go' light fails to illuminate provided that the N_2 of the affected engine has achieved minimum value for take-off and the AREA indication is within the white sector.

If more than one 'clear to go' light fails to illuminate or the N_2 or AREA indication for the engine with the failed 'clea to go' light is not satisfactory the take-off must be abandone

Once 100 knots is attained attention should be centred on the N_2 instruments, as above 100 knots a decrease in N2 is the most reliable indication of thrust loss.

100kt Check (Continued)

NOTE

> It is permissible to plan an operation in anticipation of a single reheat failure before 100kts, provided that the Actual Take-Off Weight is less than the Corrected Performance RTOW by a certain amount see Performance Manual section I. In this case take-off may be continued provided that the N_2 of the affected engine has achieved minimum value for take-off and the go lights of the remaining three engines are on at 100kts.

At airspeeds above 100 knots the loss of one reheat and the related 'clear to go' light can be accepted provided that N_2 indications are correct. Re-selection should not be attempted but the switch must be left at reheat in order to:

(i) Get maximum advantage from automatic contingency on the engine with the failed reheat in the event of failure of another engine.

(ii) Permit immediate manual selection of contingency power in the event of failure of another engine.

NOTE

> In the case of continued take-off with one reheat failed before 100kts, failure of another reheat after 100kts (second failure) constitutes an "engine failure" and take-off must be abandoned.

Crew Duties - Crew duties on take-off are as follows:-

(1) Pilot flying
One hand on throttles up to V_1
Other hand on control column
Removes hand from throttles at V_1 and places on Control Column.

(2) Pilot not handling aircraft
At 60 knots calls "Speed Building"
Calls "100 knots", V_1", "Rotate", "V_2", "Positive Climb", "240 knots",

> A positive climb should not be considered as established until the radio altimeter indicates more than 20 ft.

Monitors engine instruments with the Flight Engineer.

(Completely Revised)

Crew Duties - Continued

(3) Flight Engineer

- Controls the reheat selectors throughout
- Re-selects any reheat in the event of non-ignition below 60kts.

  Re-selection of reheat above 60kts is not permitted as it imposes a time lag that will reduce the likelihood of achieving full take-off thrust in time for the 100kt check.

- Maintains tactile Monitoring of the no. 4 engine N_1 limiter switch up to 60kts. If it has not disengaged by the time the co-pilot calls "airspeed building" (60kts), it must be manually disengaged.
- Monitors the engine indications as follows:-

  (a) Observe N_2 of engines 1, 2 and 3 attain the minimum N_2 for take-off. Engine 4 will be slightly retarded.

  (b) Observe N_1 of engines 1, 2 and 3 are sensibly in line with engine 4 slighly retarded.

  (c) Observe all FT flags in view and the Fuel Flow of engine 1, 2 and 3 sensibly in line with engine 4 slightly retarded.

  (d) Observe all EGTs increasing.

  (e) Observe Area of Engines 1, 2 and 3 increase to within the white sector with engine 4 in the yellow sector. The Area of Engine 4 may enter the white sector at this stage; this is an acceptable indication.

  (f) At 60 knots no. 4 N_1 limiter disengages, observe engine 4 parameters increase to take-off power and are sensibly in line with the other engines.

  (g) Observe all four "clear to go" lights illuminate.

  (h) Maintain a continuous scan of engine primary indications and go lights.

  If one Go light fails to illuminate but the above sequence of engine monitoring shows the subject engine to have achieved take-off power, in particular THAT N_2 HAS ACHIEVED MINIMUM VALUE FOR TAKE-OFF AND THE AREA IS WITHIN THE WHITE SECTOR, then the take-off will be continued.

  If the Area is not within the white sector, but the N_2 check was satisfactory and the pre-flight performance calculations established that a take-off may be scheduled on three reheats, then the take-off will be continued.

(Completely Revised)

Flight Engineer - Continued

- Calls "Power Checked" or "Engine Failure" in response to the 100kts call.

  In the case of continued take-off with one reheat failed before 100kts failure of another reheat after 100kts (second failure) constitutes an "engine failure" and take-off must be abandoned.

Directional Control - Directional control during the take-off roll is maintained by use of the rudder pedal operated nose wheel. The control column should be held neutral even in a cross wind; into wind elevon should not be used.

The rudder pedal operated nose wheel gives adequate steering during take-off and landing on wet or dry runways, in cross winds or with asymmetric power.

Rotation - Rotation is carried out to the pitch attitude set on the white pitch index i.e. the 3-engine V_2 initial attitude (θ_2). Lift off occurs 2 or 3 knots before V_2 and at about 10^o pitch attitude.

Rotation is carried out at a normal rate for a jet aircraft. The optimum rotation time from control input to achieving θ_2 on a noise abatement T/O is 5-6 secs. Too rapid rotation or ove rotation adversely affects take-off distance (in the extreme case over rotation causes a tail strike). Under rotation gives increased take-off speeds which can mean exceeding tyre limit speeds. As the aircraft operates frequently at or near tyre limit speeds, a normal rotation to the correct pitch attitude is therefore as important for tyre speed considerations as it is for performance and noise.

Gear-Up - When a positive climb is established the gear is retracted. An extended gear reduces the rate of climb by about 400 feet per min.

A positive climb should not be considered as established until the radio altimeter is indicating more than 20 feet.

Trim - The trim settings used for take-off are approximately correct for stabilisation at the correct climb out speeds.

Initial Climb - After rotation the aircraft is accelerated by keeping it at the pitch attitude θ_2 set before take-off. The acceleration should be continued to reach V_{MO} or to reach the TMA climb speed. The Flight Engineer selects reheat OFF at 500 feet and FLIGHT at 1000 feet on command.

NOISE ABATEMENT

After rotation the aircraft is accelerated by keeping it at the pitch attitude θ_2 until airspeed approaches the noise abatement speed, V_N. Pitch attitude is then increased so that V_N is maintained. At noise abatement time power is reduced and pitc attitude is decreased to continue at V_N. The amount of anticipation required during the acceleration to V_N and the pitch attitude required to maintain V_N, vary with power, aircraft weight, pressure altitude and air temperature. Airspeed values given to provide anticipation guidance are approximations, less anticipation may be required. Pitch attitude values given for guidance are likewise approximations.

TYPICAL HEAVY TAKE-OFF WEIGHTS

Initial Climb - After rotation the aircraft is accelerated by keeping it at the pitch attitude θ_2 set before take-off. At 240 knots or soon after, pitch attitude should be increased to ensure that the noise abatement speed of 250 knots is not exceeded. 18° pitch attitude is a useful approximate target, but this will rarely be the exact attitude required, it may be greater or less. Having increased pitch attitude, adjustments in attitude should be made as necessary to maintain 250 knots.

Power reduction - At noise abatement time the Flight Engineer selects reheat OFF and immediately reduces power to the noise abatement setting. The pilot flying should decrease the pitch attitude to approximately 12° and then adjust the aircraft about that attitude to maintain 250 knots. 12° pitch attitude is a useful approximate target, a higher figure is not normally required but at low take-off weights a lower figure will be. The reheat must not be selected OFF and the power must not be reduced if the speed is lower than 240 knots.

Speed - During the noise abatement procedure the speed of 250 knots should be maintained. If a lower speed is inadvertently achieved, the attitude should be cross checked and adjusted as necessary to achieve 250 knots. If the rate of climb is significantly less than 700 feet per minute sufficient power should then be applied to re-establish the required climb and to slowly regain speed.

A one-per-cent (1%) increase in N_2 will counteract a shortfall of about 200 feet per minute.

If the speed is allowed to fall below 240 knots after reheat off selection and power reduction, the desired noise abatement gradient will not be achieved. In this case the attempt to carry out a noise abatement procedure should be discontinued and a gross power increase made.

If the speed is allowed to increase to above 250 knots, it should be brought back to 250 knots.

LIGHT TAKE-OFF WEIGHTS

Initial Climb - After rotation the aircraft is accelerated by keeping it at the pitch attitude θ_2 set before take-off. At 240 knots approximately, pitch attitude should be increased to ensure that the noise abatement speed of 250 knots is not exceeded. At light weight with take-off power and reheat, a pitch attitude of up to 27° would be required to maintain V_N but in practice it is unlikely that a pitch attitude greater than 22° will be reached before a decrease in pitch attitude is required at noise abatement time.

Power reduction - At noise abatement time the Flight Engineer selects reheat OFF and immediately reduces power to the noise abatement setting. The pilot flying should decrease the pitch attitude to approximately 10° and then adjust the aircraft about that attitude to maintain 250 knots. 10° pitch attitude is a useful approximate target, a higher figure, up to 12°, may be required.

UNREHEATED TAKE-OFF

Initial Climb - After rotation the aircraft is accelerated by keeping it at the pitch attitude θ_2 set before take-off. At 215 knots or soon after, pitch attitude should be increased to ensure that the noise abatement speed of 225 knots is not exceeded. 18° pitch attitude is a useful approximate target but this will rarely be the exact attitude required, it may be greater or less. Having increased pitch attitude, adjustments in attitude should be made as necessary to maintain 225 knots.

Power reduction - At noise abatement time the Flight Engineer immediately reduces power to the noise abatement setting. The pilot flying should decrease the pitch attitude to approximately 12° and then adjust the aircraft about that attitude to maintain 225 knots. 12° pitch attitude is a useful approximate target, a higher figure is not normally required but at low take-off weights a lower figure will be.

POWER RESTORATION

At the end of the noise abatement procedure the Flight Engineer selects FLIGHT and on command advances the throttle levers fully to give climb power. Alternatively, over noise sensitive areas, the power may be increased using the following schedule of N_2 against altitude; 93% at 3000 ft, 95% at 4000 ft, 97% at 5000 ft, 99% at 6000 ft, 101% at 7000 ft, and full CLIMB power at 8000 ft.

The pilot flying should decrease the attitude (to about 10° initially) to accelerate to the TMA climbing speed.

Nose and Visor - Below 250 knots the visor must be down with the nose at 5° (forward visibility consideration). Nose and visor operation must not be made below 500 feet above the terrain. When the nose and/or visor are moved, the aircraft's flight path should be maintained by either the autopilot or by instrument reference, in order to guard against any tendency to disorientation.

Acceleration to V_{MO} - This can be done either whilst climbing or in level flight. In level flight it is necessary to anticipate arrival at V_{MO} by 15 knots. Attitude should be increased to about 10° (if the intention is to climb), or power should be reduced (if the intention is to maintain level flight) because speed increases rapidly. If the climb is continued the aircraft must be stabilised at V_{MO} (either manually or by using the datum adjust) before MAX CLIMB mode of the autopilot is engaged.

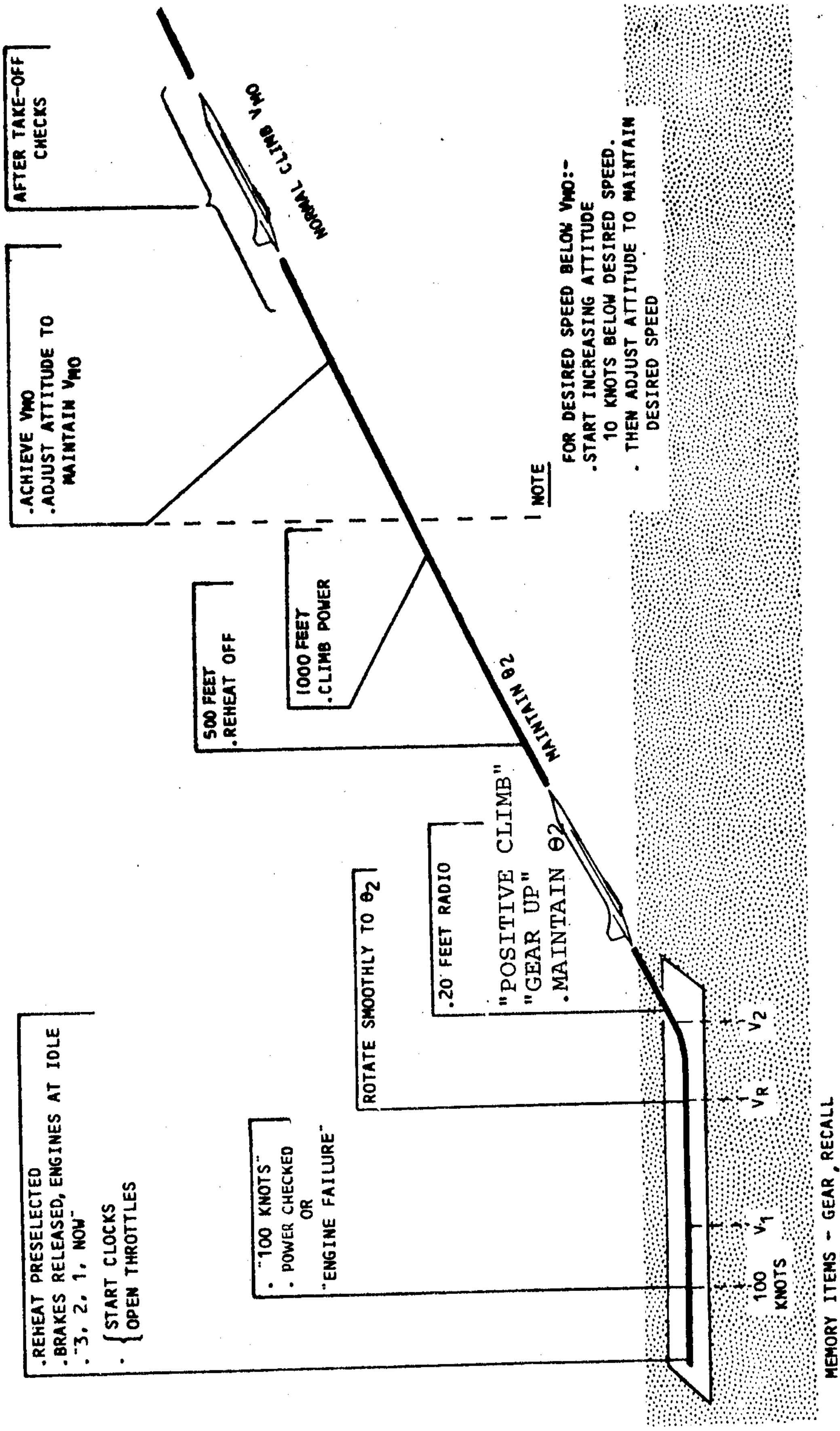
V_{MO} and Fuel Penalties - The best climb speed for fuel economy is V_{MO}. As speed reduces below V_{MO} the fuel penalty becomes increasingly severe. It is important to accelerate to V_{MO} and climb to cruise altitude as soon as possible consistent with ATC restrictions.

Bank Angles - Bank angles in excess of 30° should be avoided as they cause fuel and performance penalties.

When making large sustained turns after take-off the rate of climb should be closely monitored as such turns will cause a reduction of the climb gradient and can easily result in zero or even negative rates of climb. This is particularly true when the turn is associated with the reduction in pitch attitude necessary to accelerate to 300 Kt or V_{MO}.

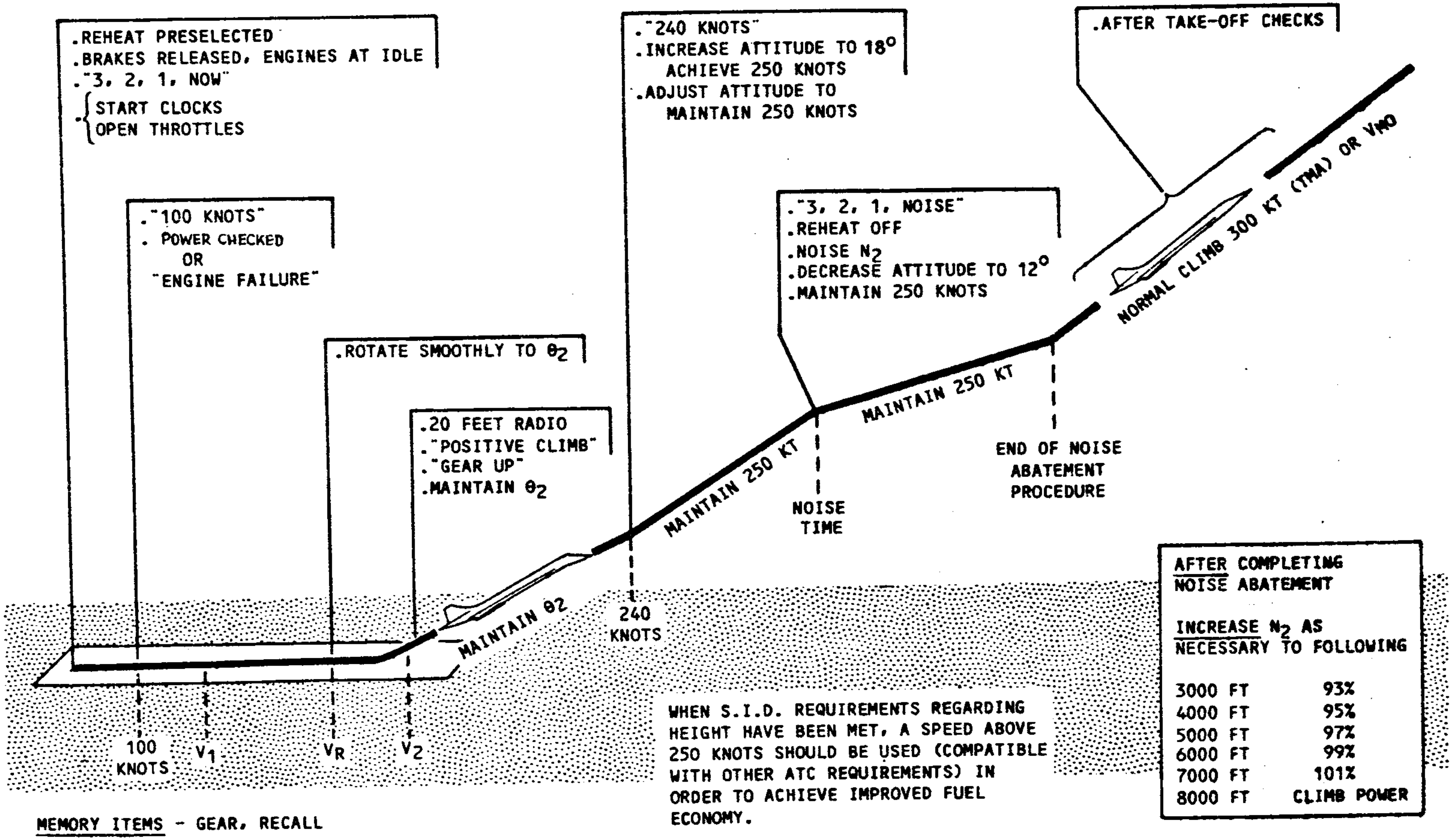
Buffet at Low Speeds - Above an angle of attack of about 7° the wing tip vortices generate a slight buffet similar to that on a subsonic aircraft with high-lift devices extended. This buffet is more noticeable when the nose and visor are up.

TAKE OFF AND INITIAL CLIMB
NORMAL TAKE-OFF



NORMAL TAKE-OFF

TAKE-OFF AND INITIAL CLIMB
NOISE ABATEMENT TAKE-OFF


.REHEAT PRESELECTED
.BRAKES RELEASED, ENGINES AT IDLE
."3, 2, 1, NOW"
.{START CLOCKS / OPEN THROTTLES
."100 KNOTS"
. POWER CHECKED OR "ENGINE FAILURE"
.ROTATE SMOOTHLY TO θ_2
.20 FEET RADIO
."POSITIVE CLIMB"
."GEAR UP"
.MAINTAIN θ_2
."240 KNOTS"
.INCREASE ATTITUDE TO 18° ACHIEVE 250 KNOTS
.ADJUST ATTITUDE TO MAINTAIN 250 KNOTS
."3, 2, 1, NOISE"
.REHEAT OFF
.NOISE N_2
.DECREASE ATTITUDE TO 12°
.MAINTAIN 250 KNOTS
.AFTER TAKE-OFF CHECKS
MAINTAIN θ_2
MAINTAIN 250 KT
MAINTAIN 250 KT
NORMAL CLIMB 300 KT (TMA) OR VMO
100 KNOTS
V_1
V_R
V_2
240 KNOTS
NOISE TIME
END OF NOISE ABATEMENT PROCEDURE

WHEN S.I.D. REQUIREMENTS REGARDING HEIGHT HAVE BEEN MET, A SPEED ABOVE 250 KNOTS SHOULD BE USED (COMPATIBLE WITH OTHER ATC REQUIREMENTS) IN ORDER TO ACHIEVE IMPROVED FUEL ECONOMY.

AFTER COMPLETING NOISE ABATEMENT

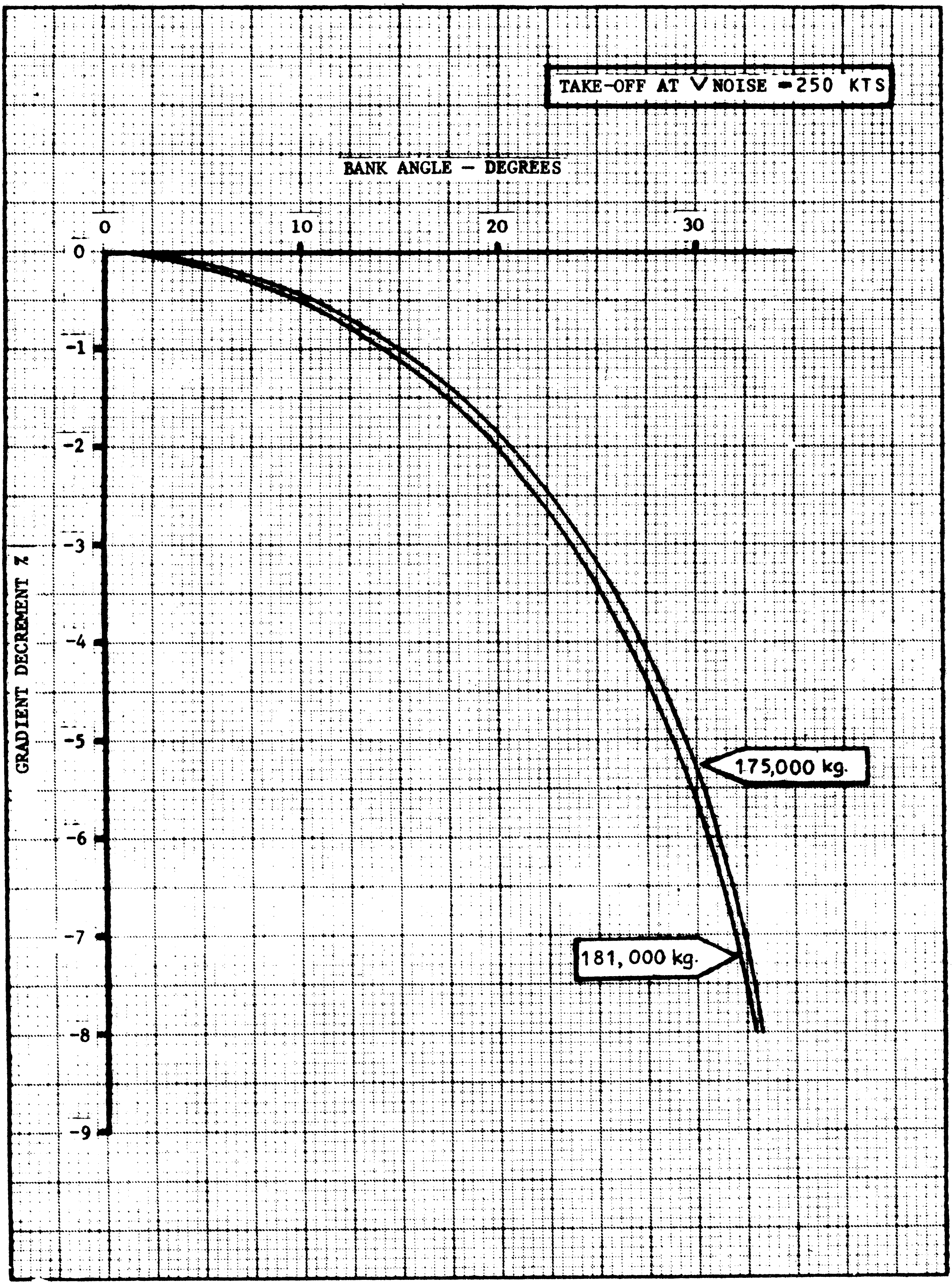
INCREASE N_2 AS NECESSARY TO FOLLOWING

3000 FT	93%
4000 FT	95%
5000 FT	97%
6000 FT	99%
7000 FT	101%
8000 FT	CLIMB POWER

MEMORY ITEMS - GEAR, RECALL

NOISE ABATEMENT TAKE-OFF

TAKE-OFF AND INITIAL CLIMB
EFFECT OF BANK ON PERFORMANCE



PROCEDURES AND TECHNIQUES

SUBSONIC CLIMB

Procedure - The recommended procedure is to climb at V_{MO} if the climb is to be continued to supersonic speeds or to climb at V_{MO} and then 0.93 if the climb is to a subsonic flight level.
Rearward trim transfer should begin at Mach 0.70.

Climb to Subsonic Cruise - Rearward trim transfer should be stopped at 55% Co for subsonic cruise or if the acceleration is interrupted below Mach 1.00.

SUBSONIC CRUISE

Speed - The subsonic cruise is carried out at Mach 0.95.

Flight Level - The optimum flight level for subsonic cruise varies considerably with the aircraft weight. (At heavy weights, as for example following a maximum weight take-off, the optimum subsonic flight level for specific range is initially FL.250). Any increase in subsonic cruise flight level above the optimum will have an adverse effect on specific range.

As height is increased above the optimum, the I.A.S. at Mach 0.95 can fall progressively below the minimum drag speed for the weight. Drag can thus become more penalising until height cannot be maintained at subsonic speeds.

Maximum Level - At maximum landing weight the optimum level is about FL.370.

Regardless of weight it can be seen from the Flight Envelope that above 41,000 feet the IAS equivalent to Mach 0.95 is prohibited by V_{LA} (Lowest Authorised Speed).

Caution - At heavy weight a large power increase may be required to regain speed following inadvertent deceleration to speeds below about 300 knots. If climb power is insufficient, reheat should be used and if necessary the aircraft should be descended to increase the speed to the lesser of V_{MO} or M = 0.95. The desired level should then be regained by climbing at V_{MO}.

Subsonic Cruise Power - Engine control schedule should be selected to 'flyover' above Mach 0.8 for optimum performance.

CG - The recommended procedure is to fly with a CG position of 55% Co which may give an elevon deflection of 2 to 2.5° down. This deflection is acceptable because the CG position is considered more important than the elevon deflection.

TRANSONIC ACCELERATION AND SUPERSONIC CLIMB

Procedure - The recommended procedure is to climb at V_{MO}/M_{MO} until Mach 2.00 (or T_{MO} 127°C) is reached. This is also the best procedure for optimum specific range. From Mach 0.93 (at approximately FL.250) to Mach 1.70 (at approximately FL.440), reheat is used.

When further climb is determined only by the decrease in weight due to fuel consumption, the supersonic climb becomes a cruise/climb.

Speed - The correct speed for transonic acceleration and climb is V_{MO}. If at any time, the speed is allowed to drop below V_{MO}, it is desirable to regain V_{MO} as soon as possible. The recommended procedure in this case, is to maintain level flight until V_{MO} is regained, and then to resume the climb at V_{MO}.

Precise Pitch Attitude - The transonic acceleration and supersonic phase require precise flying in pitch. The pitch changes at V_{MO} in the transonic region are of the order of 1° but as Mach 2.00 is approached, the changes are much smaller, of the order of a few tenths of a degree (a change of half a degree at Mach 2.00 can cause a vertical speed change of 1000 feet per minute).

Normally the auto pilot is used and it makes these changes smoothly and accurately but for flight without the use of auto pilot, Max climb mode of the flight director is recommended for guidance. If the auto pilot and the flight director are not available, the white pitch index on the A.D.I. should be set to the mean pitch attitude required, and small corrections made about it.

Trim and V_{MO} - The major part of the trim change which occurs during the climb and acceleration is counteracted by Mach trim and by fuel transfer. In manual flight, precise pitch attitude changes to maintain V_{MO} are made easily, but, particularly between Mach 0.93 and Mach 1.30, continued and careful use of trim is required.

Speed and V_{MO} - As altitude increases from about FL.320 to FL.440, V_{MO} also increases from 400 knots to 530 knots. A slight decrease in attitude is therefore necessary to increase speed as the V_{MO} increases.

V_{MO} Pointer - In the higher Mach number range, the V_{MO} pointer indicates the limiting I.A.S. determined by V_{MO}, M_{MO} or T_{MO}.

M_{MO} Pointer - In the higher Mach number range, the M_{MO} pointer indicates the limiting Mach number determined by V_{MO}, M_{MO} or T_{MO}.

Reheat OFF - At Mach 1.70 or after 15 minutes, reheats must be selected off, and the climb continued with climb power.

(Unchang

Roll Balance - Due to the position of the various pairs of wing tanks, equal quantities of fuel in any pair do not necessarily imply roll balance, and any unbalance in roll produces a differential deflection of the elevons which causes an increase in drag. An unbalanced condition can be seen on the Flight Control Position Indicators. To correct an unbalanced condition, transfer fuel from the down-elevon side to the up-elevon side.

Climb Interruption - The aircraft is at its least efficient between Mach 0.97 and Mach 1.40.

If clearance to climb unrestricted to FL.440 or above cannot be obtained, it is advisable to maintain the optimum subsonic level at Mach 0.95 until clearance is received. The optimum level depends on aircraft weight (see SUBSONIC CRUISE).

Acceleration from Subsonic Cruise - Ideally the acceleration and climb is a continuation of the V_{MO} climb without interruption until Mach 2.00 is reached. However if there has been an interval of flight at Mach 0.95 the recommended procedure is:-

(1) Increase pitch attitude in order to anticipate the rapid speed rise.

(2) Apply climb power.

(3) Switch reheats on in symmetrical pairs simultaneously adjusting pitch to attain and hold V_{MO}.

(4) Fuel transfer, having been stopped at 55% Co for subsonic cruise, is resumed at Mach 0.95 when the acceleration is begun.

Sonic Boom - Over areas where supersonic flight is permitted it is undesirable to increase the boom by the increased "focusing" which occurs when bank is applied. At low supersonic speeds, even very small bank angles produce this effect therefore for environmental consideration, supersonic turns below Mach 1.30 are undesirable.

The bank angle at which boom focusing begins can be determined by subtracting 1.00 from the supersonic Mach number and multiplying the result by 15.

(Supersonic Mach number minus 1.00) x 15.

Cruise/Climb - Supersonic climb performance varies the height at which the cruise climb begins.

The cold upper air temperatures found in low latitudes increase climb performance considerably so that cruise may begin above FL 55.0. Conversely the warm upper air temperatures in high latitudes decrease climb performance so that cruise/climb may begin below FL 550. In warm temperatures in flight is limited to T_{MO}.

The detailed procedures for operating at the cruise climb flight levels are given under. AUTO PILOT.

The warm upper air temperatures in high latitudes decrease climb performance so that cruise/climb may begin below FL.550. In warm temperatures, flight is limited by T_{MO}.

(Deletion)

NOTES:

1. Boom and boom focusing must be fully understood and great care taken to ensure that a protected area is not boomed.

2. The pilot should appreciate the limitations placed on acceptable levels on climb and descent due to sonic boom and aircraft performance.

3. It is essential that the pilot monitors the CG/Mach relationship and liases closely with the Flight Engineer to effect the required fuel transfer.

Continued..

Cruise/climb - Continued

NOTES: 4. The crew should frequently cross check the Mach number and centre of gravity. All of the crew need to be thoroughly familiar with the Flight Envelope and CG corridor.

SUPERSONIC CRUISE

General - In order to achieve optimum performance, a cruise climb technique at full throttle, constant Mach No. and at the aircraft ceiling should be applied whenever possible. Cruise mach no. is much affected by wind and temperature and at high altitudes, particularly in the vicinity of the tropopause there are generally rapid and significant changes in wind and temperature. For example, changes of 5°C in 3 nm horizontally or 500 ft vertically are frequently seen in lower latitudes and this will cause a change in Mach No. of + 0.025 for a drop in temperature and -0.025 for an increase. A relatively small wind shear of 15 knots will have the same effect.

This means that supersonic cruise characteristics can be affected by the height of the tropopause and the conditions surrounding it. In polar conditions, where at high altitude the ambient temperature is usually above I.S.A., the tropopause can be as low as 20,000 ft, and in tropical conditions it can be as high as 60,000 ft with very low ambient temperatures. It is also common to find significant inversions between 50,000 ft and 60,000 ft in lower latitudes and turbulence can be associated with wind and temperature changes. In all these conditions the ambient temperature has a considerable effect on the aircraft ceiling at a given weight.

Use of the AFCS in Climb and Cruise - In order to cope with the conditions described above, procedures for the use of the AFCS have been developed in order to minimise crew workload, and they are described in the AFCS section. It is important to appreciate that changing atmospheric conditions will cause fluctuations in Mach No. above and below the nominal optimum cruise Mach No. of M = 2.00, particularly in cold conditions. Fluctuations between M = 1.96 and M = 2.03 should be tolerated and pilot intervention should be avoided. The effect of these Mach number fluctuations on fuel consumption is negligible.

Turns - The increase in angle of attack in a turn gives an increase in induced drag which will cause a speed reduction if altitude and thrust remain constant. Heading changes of 10° carried out with bank angles of 20° to 25° do not cause notable speed reductions. However, as soon as bank exceeds 20° and the change of heading exceeds 10° it becomes necessary to descend in order to maintain the speed. After the turn is completed the cruise climb is resumed at V_{MO}/M_{MO}.

At Mach 2.0 a 30° bank turn has a radius of 36 nautical miles.

At Mach 2.0 a 20° bank turn has a radius of 56 nautical miles.

CG - In supersonic cruise, minimum drag and best specific range are achieved with half a degree of down deflection of the elevons. It is therefore recommended that the CG is controlled within limits by suitable fuel usage and/or trim transfer so as to maintain a deflection on the Flight Control Position Indicators of between zero and 1° down elevon.

Collector Tanks - Providing that tank pressure is satisfactory, the minimum permissible contents in the collector tanks for continuing supersonic cruise is as follows:-

1000 kg for tanks 1 and 4

1000 kg for tanks 2 and 3

When these minima can no longer be maintained by further transfer

Collector Tanks - Continued

from tank 11 because the forward CG limit has been reached, supersonic cruise should be discontinued.

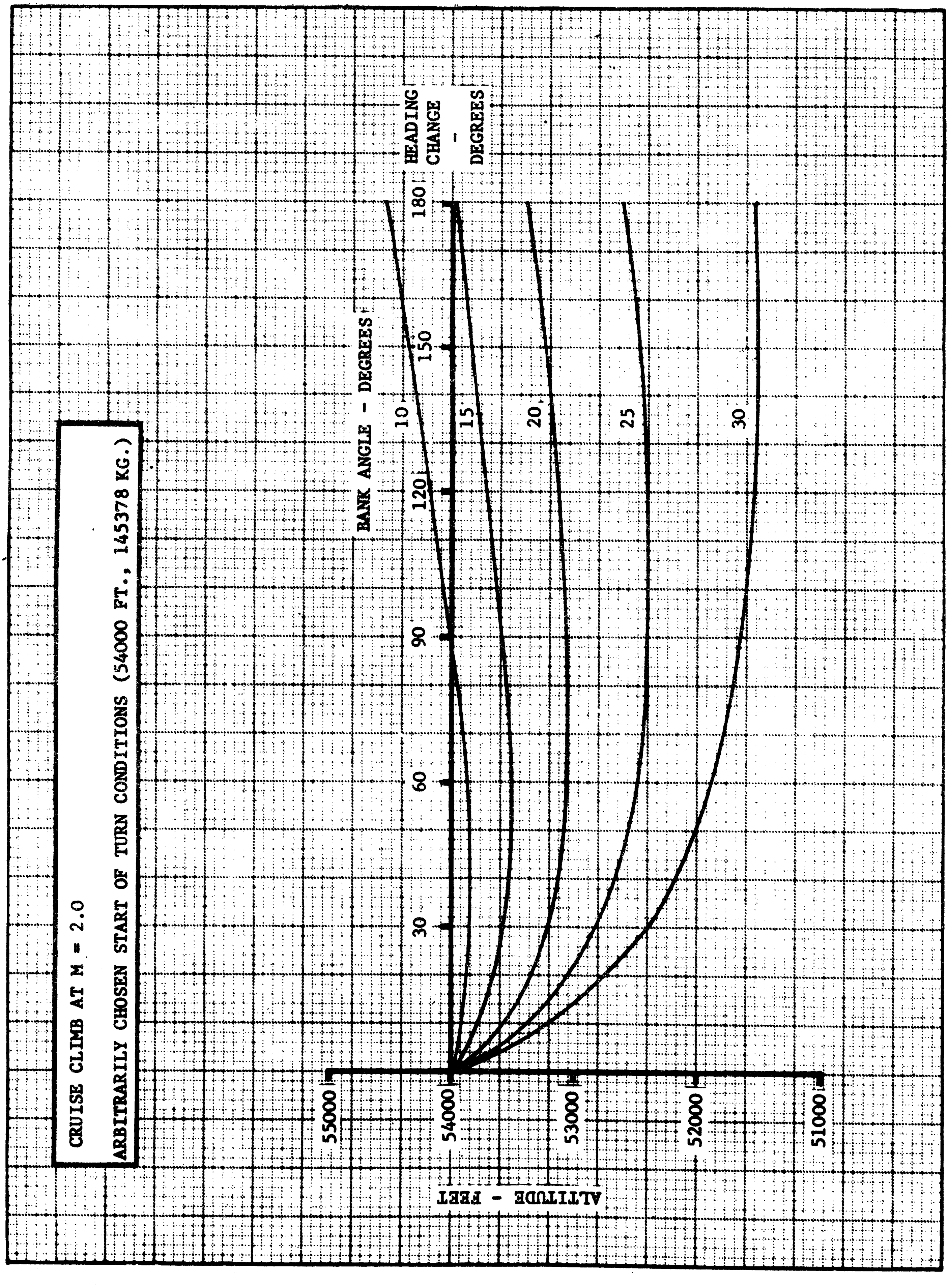
Navigation - It is essential that agreed supersonic corridors are adhered to other than in emergency.

Cruise Procedures - Are described in the AFCS section as follows:-

Cruise Climb
Stepped cruise climb
Level cruise
Cruise at or below 47000 ft.

(Unchanged)

SUPERSONIC CRUISE
EFFECT OF BANK ON PERFORMANCE

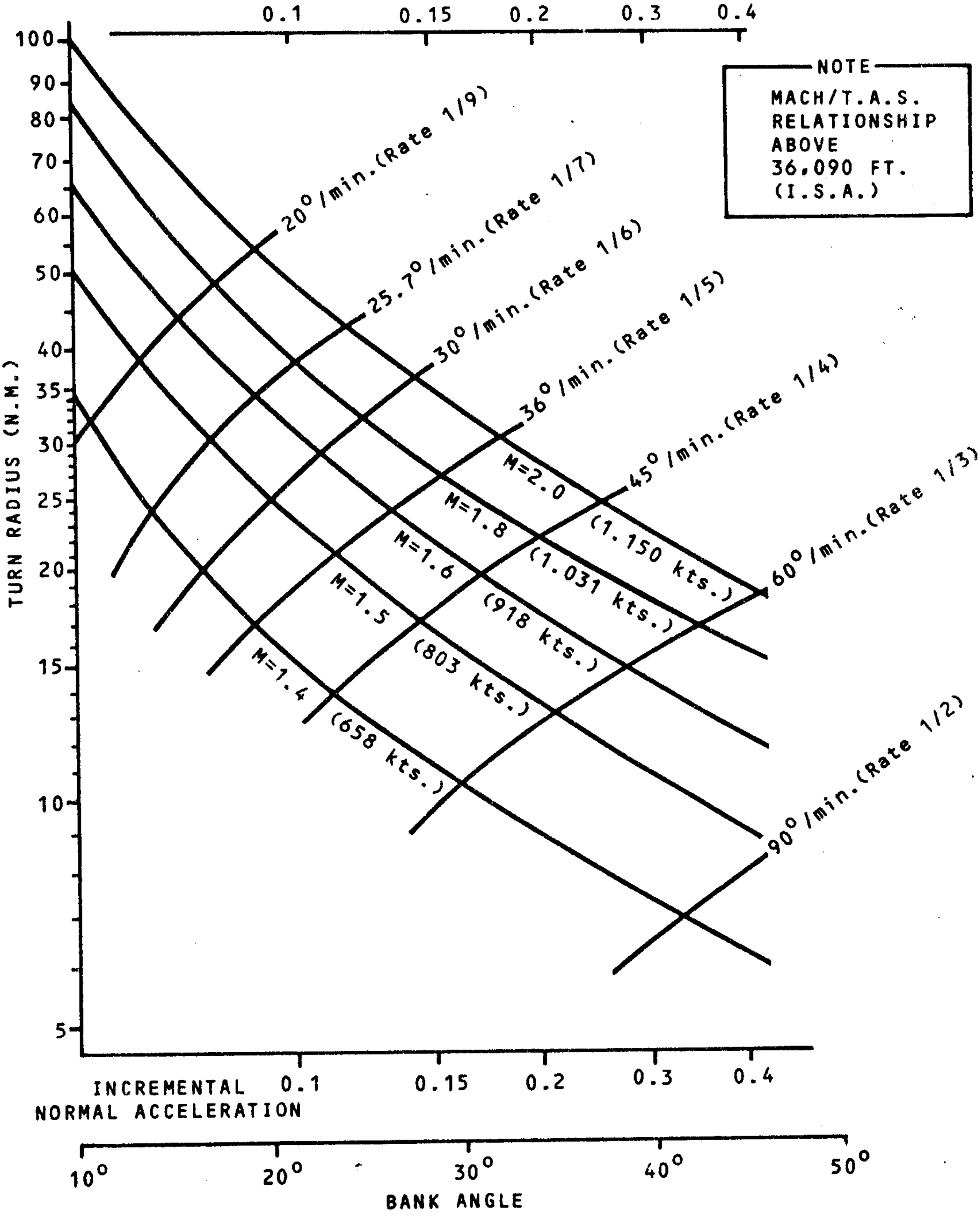


CRUISE CLIMB AT M = 2.0

ARBITRARILY CHOSEN START OF TURN CONDITIONS (54000 FT., 145378 KG.)

SUPERSONIC CRUISE

TURNING RADIUS AT SUPERSONIC SPEEDS



DECELERATION AND INITIAL DESCENT

Descent Speeds - The recommended procedure uses a descent speed of 350 knots and flight planning is normally based on this speed. However 325 kts or any speed up to V_{MO} may be used provided that there are no overriding considerations.

At the higher speeds, however, there is a more marked nose down trim change in the transonic region. It is advisable therefore to keep the aircraft trimmed in order to avoid overspeeding.

Power - Deceleration is initiated by bringing all four throttle levers back to 18° Throttle Lever Angle (T.L.A) if the static temperature is warmer than ISA - 10°C, or 24° T.L.A, if the static temperature is colder than ISA -10°C.

When the speed reaches Mach 1.60 the throttle levers are brought back to 34° T.L.A.

When the speed reaches Mach 1.00 the throttle levers may be brought back to idle.

Deceleration/Descent - The recommended procedure is to maintain the cruise altitude until 350 knots is approached. The attitude is then adjusted to maintain the speed. If flying manually the power reduction will cause a pitch down tendency which must be corrected by pitch control. If the auto pilot is in use, ALT HOLD mode should be engaged to maintain the cruise altitude until 350 knots, then engage IAS HOLD.

Interrupted Descent - Above FL.410 any interruption of the descent will adversely affect the aircraft's performance, and the fuel situation, and will also extend the boom area.

If the descent is interrupted at or below FL.410 the level segment is flown at Mach 0.95. Below FL.330 an increase in speed may be required to maintain Mach 0.95.

Fuel Transfer - The forward fuel transfer is initiated according to schedule. If the descent is interrupted, forward fuel transfer is stopped.

Attitude Changes - Significant attitude changes are required in the transonic region in order to maintain the required descent speed. As Mach 1.00 is approached, a reduction in attitude is required and at about Mach 0.95 an increase is required.

The auto pilot in IAS HOLD mode controls these changes smoothly and accurately. When flying manually it is recommended to use the Flight Director.

Turns when Handflying - If handflying in the region between Mach 1.30 and Mach 0.97, smooth accurate flying becomes more demanding because of the trim changes in pitch. Turns should therefore be avoided if possible. If a turn is necessary, bank angle should be limited as far as possible to 15°.

Sonic Boom - see TRANSONIC ACCELERATION AND CLIMB

Delays - Delays in deceleration must be avoided when the descent is being made towards a sonic boom protected area, since the subsequent erosion of the protection distance will be extremely difficult to recover.

INTERMEDIATE DESCENT (SUBSONIC)

In-Flight Reverse - To obtain reverse idle, Flight Reverse must first be armed and then selected on either or both inner engine(s).

When reverse is selected, a slight pitch up moment is induced and the rate of descent for a given speed is approximately doubled.

Autothrottle - Reaching and maintaining a level after descent requires that the correct power for the desired speed should be applied at the appropriate time to prevent an unwanted loss of speed or altitude.

It is strongly recommended that below 10,000 feet, autothrottle is engaged and flight levels are pre-selected on Altitude Acquire. If autothrottle is not available special care must be taken.

Airspeeds - Recommended airspeeds are as follows:-

HOLDING PATTERNS

High level	280 knots
Medium and Low level	250 knots

TERMINAL AREAS

Where speed restrictions apply	250 knots

Approach - It is essential to strike a reasonable balance between fuel conservation, and the need to have the calm unhurried type of approach which is necessary for a safe and properly monitored operation. The following table gives the recommended, and maximum speeds for various distances to touchdown.

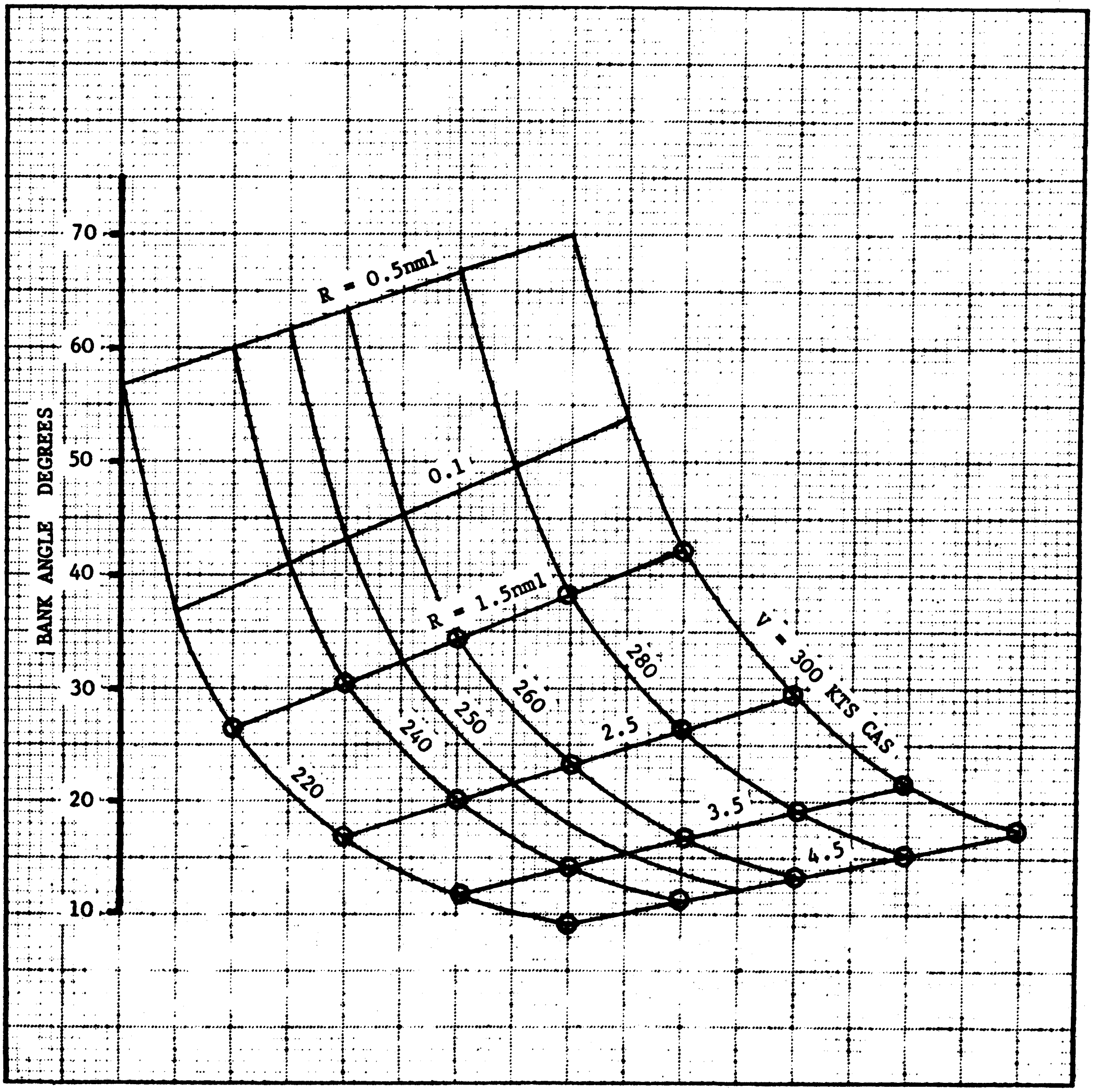
DISTANCE TO TOUCHDOWN	RECOMMENDED SPEED	MAXIMUM SPEED
15 - 20 miles	250 kts	300 kts
12 - 14 miles	210 kts	250 kts
8 - 11 miles	VREF + 30 kts (minimum 190 kt)	210 kts
5 - 7 miles	V REF + 15 kts	VREF + 30
0 - 4 miles	V_{REF}	V_{REF} MAX

Visual traffic pattern	V_{REF} + 50

NOTE: Speeds up to 250 knots may be used in a visual traffic pattern in order to reduce noise and fuel consumption.

ILS beam interception	V_{REF} + 30 (minimum 190 knots)

BANK ANGLE FOR TURN RADIUS AND SPEED
LOW ALTITUDE



(Unchanged)

APPROACH AND LANDING

Briefing - Crew briefing should, in so far as is practicable, be completed with the Deceleration and Descent Check, at which time all information relating to the holding, approach, landing or go-around and diversion should be reviewed. As with the Abandoned Take-Off drill, it is considered good practice to review each day the Missed Approach drill.

Nose and Visor - Below 250 knots the visor must be down with the nose at 5° or "down" (cockpit visibility consideration).

Nose and visor operation must not be made below 500 feet above the terrain. When the nose and/or visor are moved, the aircraft's flight path should be maintained by either the auto pilot or by instrument reference, in order to guard against any tendency to disorientation.

Nose and visor selections are made within the limitations but when cockpit noise is the only other consideration, it is recommended to lower the visor and nose to 5° when the speed is below 270 knots, and to lower the nose from 5° to DOWN below 220 knots.

Angles of Attack - For a given airspeed, the angle of attack approximates closely to the pitch attitude required for level flight. Angles of attack as shown on the incidence meter can thus be used as a guide to attitude required. At typical landing weights, the angles of attack for given airspeeds are as follows:-

250 knots = 6° to 7°

200 knots = 9° to 10°

V_{REF} = 13° to 14°

For turns with up to 30° bank at constant altitude, such figures can still give useful guidance.

For descent on a 3° glide slope the angle of attack remains the same for the same speed, but the attitude is 3° less.

(angle of attack plus flight path angle = attitude).

Above an angle of attack of about 7° the wingtip vortices generate a slight buffet similar to that on a subsonic aircraft with high lift devices extended.

Pitch Attitude - On final approach when speed is established pitch attitude is normally about 11° on a 3° glide slope (incidence 14°). It will be found useful to set the white pitch index bar to this position.

Speed - The V_{REF} appropriate to the landing weight, the target speed, and the maximum-threshold-speed should be indexed on both pilots A.S.Is.

Speed changes on approach require considerable attitude changes. On approaches other than Reduced Noise Approaches aim at a stabilised approach speed by 700 ft.

Wind - Full use should be made of INS on final approach to assess wind shear.
Assess any displacement from runway centre line on approach. Corrections should take into account present drift and forecast drift at the threshold. Avoid being upwind when crossing the

Wind - Continued

threshold, as this increases the difficulty of lining up with the runway centre line without excessive crabbing at touchdown. Take care not to land on the downwind side of the runway.

Approach and Landing in Wind Shear Conditions - Concorde's autothrottle is much more sensitive to, and capable of dealing with, wind shear conditions than the human pilot. Careful monitoring of autothrottle controlled throttle lever movement and its consequent control of airspeed is an excellent way of detecting wind shear conditions. Combining the autothrottle capability of dealing with wind shear conditions with the autoland capability of the aircraft leads to the following recommendations for approach and landing in wind shear conditions:-

WITH AUTOTHROTTLE

(1) Use full Autoland procedure having checked that all the prerequisites for an autoland have been fulfilled.

(2) If for any reason an autoland is not possible then a manual approach with autothrottle is recommended, rather than a coupled approach which, with autopilot disconnect at ILSC minima, could coincide with the altitude of worst shear, thereby causing the pilot an undesirable handling problem on transition from coupled to manual flying.

(3) (a) If, during the approach while above 300 ft. R.A. speed falls below target speed minus 10 kts. (V_{TT} - 10 kts) the pilot should be alert to severe wind shear conditions, and consideration given to discontinuing the approach.

(b) If, during the approach, and below 300 ft. R.A. the speed falls below V_{TT} - 10 kts., an immediate Go-Around should be initiated.

WITHOUT AUTHROTTLE

(1) In severe predicted wind shear conditions consideration should be given to diverting to another airfield.

(2) If a decreasing headwind component is expected ADD ½ EXPECTED Shear to V_{TT} up to V_T Max.

(3) If, during the approach, above 300 ft. R.A. the speed falls below V_{TT} - 10 kts. the pilot should be alert to severe wind shear conditions, and consideration given to discontinuing the approach.

(4) If, during the approach, below 300 ft. R.A. the speed falls below V_{TT} - 10 kts. an immediate Go-Around should be initiated.

Approaches, and Take-offs, through line squalls or well developed CBs should be avoided.

Autothrottles - Both autothrottles should be engaged if available for all 4-engine and 3-engine approaches whether visual or instrument, manual or autopilot. The pilot flying the aircraft will keep one hand on the throttles throughout the final approach in order to detect and rectify any autothrottle failure or unscheduled movement. Except during Autoland, autothrottles should be disengaged at 40 feet and the power at disengagement maintained until reaching 15 feet.

(Unchanged)

Autothrottles - Continued

Using Autothrottle, all that is required is to get into the slot using elevons (autothrottle takes care of speed), then establish the datum pitch (usually 11° but is in fact equal to incidence minus glide slope angle). Corrections are made about the datum, returning to it when re-established. Monitor rate of descent during approach.

Autothrottles Inoperative - Should both Autothrottles be unserviceable the V_{REF} is increased by 7 knots to provide a margin. It is important to remember that, unlike previous aircraft, Concorde is flying on the backside of the drag curve and is speed unstable (see diagram). The technique is to have in mind a datum power; about which small corrections can be made if speed deviates, make a positive power correction and return to the datum (or adjusted datum), when the speed is re-established. It is a considerable aid if the Flight Engineer calls the N_2 powers at frequent intervals.

Power Reduction at 15 Feet - Smoothly decrease the power to idle at 15 feet.

The lift due to thrust in the approach attitude is significant therefore the power reduction is important in effecting the flare. Pulling the power right off above 15 feet can induce an undesirably high rate of descent.

As with other aircraft it is important that excessive rates of descent do not occur near the ground. If the rate of descent is higher than normal, this must be reduced prior to throttle closure.

Height Calls - In addition to the pilot calls of "100 feet to go" (to decision heights) and "Decision Height", the procedure is for the Flight Engineer to call "radio altimeter active", then radio altitudes of 1000 ft, "800ft," "500ft" "400ft," "300ft", "200ft", "100ft", "50", "40", "30", "20", and "15".

Pitch Attitude in the Flare - Below about 100 feet no attempt is made to follow the glide-slope but the mean attitude and rate of descent at 100 feet on the glide-slope is maintained until commencing the flare.

Normally at 20 feet carry out a slight check, followed by a gentle flare at 15 feet as the throttles are closed. From that point it is necessary to apply increasing back pressure on the stick to maintain the aircraft attitude prior to touchdown. Both ground effect and throttle closure cause a marked nose down tendency.

Visual cut off is considerable on Concorde making it essential to look at the far end of the runway during the flare. This is particularly important at night when there is a tendency for the pilot to look at the area illuminated by the landing lights.

Ground Effect - Ground effect is very noticeable on Concorde. The pilot feels it as a significant nose-down tendency. If he corrects this to maintain the established pitch attitude, he is in effect commencing a flare on the control column without significantly altering the aircraft's pitch attitude. The flare is then continued to reduce the rate of descent to normal touch-down rates. The attitude change here is very small, of the order of about 1°.

Ground Clearance - In the normal attitude for touchdown the ground clearance is fairly limited. With wings level at touchdown, a pitch attitude of 12.5° or more may cause tail wheel contact depending on rate of descent. If the wings are not level ground clearance becomes increasingly limited (see diagram 08.16.07).

Therefore during the flare, if the pitch attitude exceeds 12.5°, the Co-pilot should call ATTITUDE and the Captain should derotate the aircraft to 12.5° and maintain until touchdown.

If this action is likely to cause a deep landing, then Go Around action should be initiated.

Auto-Land - Autothrottle automatically retards the throttles during the flare. When the mainwheels touch, the auto pilot and auto-throttle should be disengaged and the nosewheel smoothly lowered onto the ground.

If a go-around is made after auto pilot has been disconnected, pitch trim in the nose down sense will be required.

Autothrottle does not however, close the throttles to idle, therefore it is necessary to close the throttles in order to select reverse.

Selecting Reverse - As soon as the mainwheels touch down, reverse IDLE should be selected and the nosewheel smoothly lowered onto the ground. When the nosewheel has touched, reverse power should be selected as desired. The control column should be kept forward to counteract the nose-up tendency which increases as reverse power is increased.

The pilot should move the control column forward initially but the First Officer should then confirm this by holding it forward during the application of reverse.

If,when using reverse power on landing, the nose rises, reverse power must be immediately cancelled until the nosewheel is returned to the runway. Do not try to regain forward thrust as the movement of the buckets may result in the bucket hitting the ground.

Use of Reverse - Normal reverse should be selected on all four engines.

At 100 knots IAS reverse idle is selected on both outer engines.

At 75 knots IAS reverse idle is selected on both inner engines.

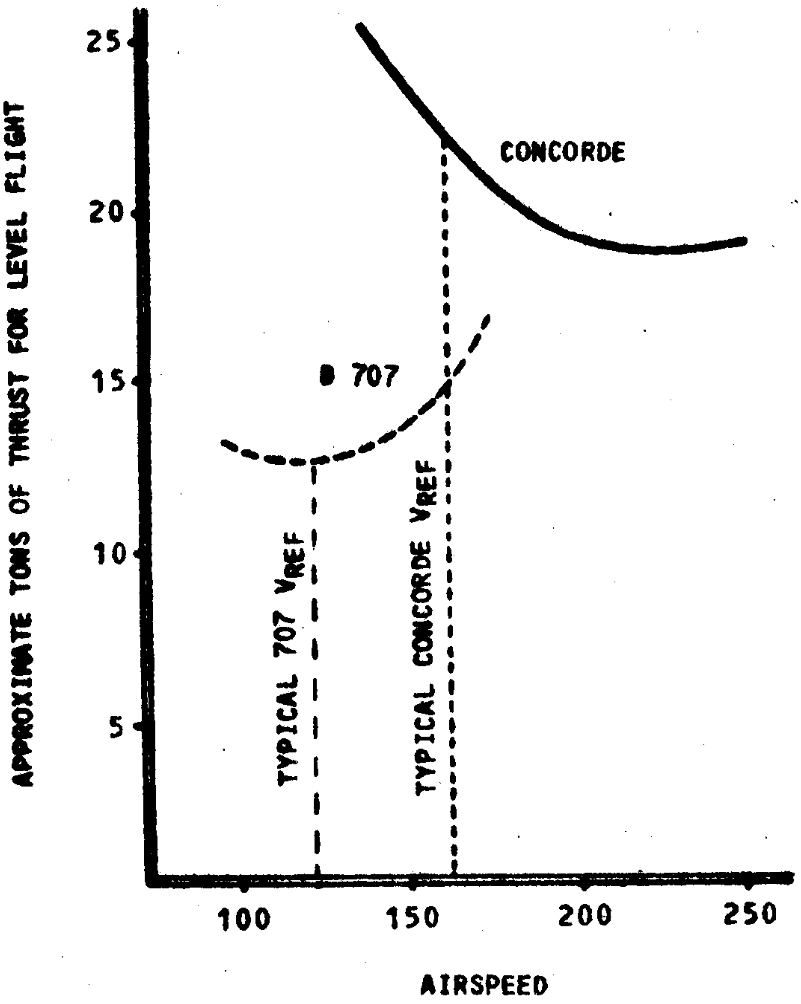
Reverse idle is permitted on all engines down to 40 knots. As this speed is not shown on the ASI, judgement is required. INS ground speed may be used as a guide to determine 40 knots.

Landing On Slippery Runway - Normal "All weather approach" speeds will be used. Maximum reverse thrust must be used on all engines.
At 100 kts, select outboard engines to reverse idle.
At 75 kts, select inboard engines to reverse idle.
Hold reverse idle to stop.

Brakes - For maximum braking, the footbrakes are applied fully as soon as the nose wheel touches down.

APPROACH AND LANDING

COMPARATIVE THRUST IN LANDING CONFIGURATION



NOTE: 1. Slope of Concorde curve is the reverse of the B 707, exhibiting a large increase in thrust with decreasing airspeed causing speed instability.

2. Flattening of Concorde curve around V_{REF} + 50

(Unchanged)

Use of Brakes in EMERG - If normal braking is not available or the anti-skid system is not available, standby braking is obtained by moving the brakes control lever to EMERG. The brake pedals must be fully released before the lever is moved from NORM to EMERG because, with the aircraft in motion on the ground and the brakes depressed, a system change-over may cause an over-torque condition at the brakes.

Anti-skid is not available. Use the brakes with care, applying pressure gently and monitoring the pressure with reference to the BRAKES pressure gauge.

On a wet runway the following technique will avoid tyre bursts, even if the maximum brake pressure is momentarily exceeded, and provide the best stopping performance.

The brakes must be completely released every 5 seconds and the following maximum pressures must not be exceeded:-

450 psi at speeds above 75 knots and
900 psi at speeds below 75 knots.

On a dry runway continuous braking to a maximum of 1100 psi is permitted.

NOTE

> If use of the emergency braking system follows the loss of the yellow hydraulic system, only fifteen brake applications are available from the brake accumulator.

Landing After Complete Brake Failure - Normal "All weather Approach" speeds will be used. Maximum reverse thrust must be used on all engines. At 85 kts select outboard engines to reverse idle. At 50 kts select inboard engines to reverse idle. Hold reverse idle to stop.

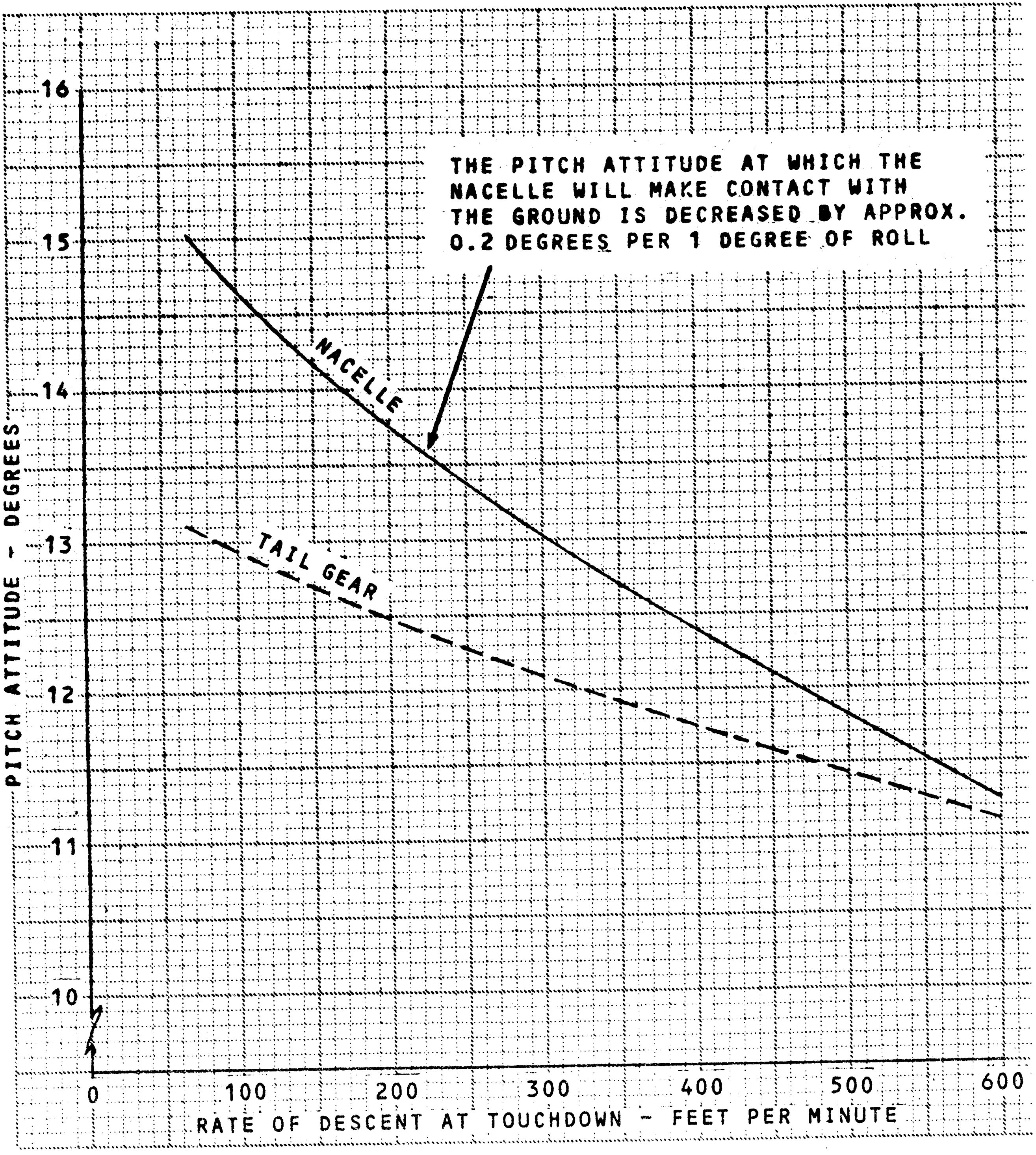
The approximate landing distance required at max landing weight sea level, still air is 10,500 feet.

Taxiing - Until familiar with the aircraft there will be a tendency to approach the runway turn-off or end of the paved surface travelling much too fast. Particular caution is required in wet or slippery conditions; refer to INS Ground Speed on the HSI. First Officers must call INS groundspeeds below 60 knots every 10 knots. Recommended maximum 90° turn off speed is 10 knots (DRY) 6 knots (WET). Exercise EXTREME caution in icing conditions when nosewheel steering may become completely ineffective on untreated taxi-ways at speeds above walking pace during turns.

Crosswind Landings - Cross wind conditions present no problems. The wings are kept level during flare and at 15 ft the crab angle smoothly removed with rudder.

GO-Around - The go-around is initiated by applying take-off power without reheat. The small rotation required is achieved with small elevon movement. When a positive climb is established, the gear is selected up and when the go-around attitude of approximately 15° is achieved speed is increased to V_{REF} + 50, and climbpower used as necessary. Bank angle should be limited to 30°. Once a go-around has been initiated it should never be cancelled.

PITCH ATTITUDE FOR CONTACT OF TAIL GEAR AND NACELLE



The average rate of descent at touch-down during a Manual Landing is 150 ft/min. Autoland R.O.D. average is 120 ft/min.

Hand Flying using Autothrottle - Autothrottle is of considerably benefit when hand flying particularly at lower speeds, provided that attitude changes are kept small. It should be remembered however, that there is a "de-stabilising effect" which becomes more apparent with large attitude changes.

Without autothrottle, the aircraft has a normal tendency to return to its original speed following a disturbance or change in attitude.
With autothrottle, speed is maintained following a disturbance or change in attitude, but the power change which achieves this, produces a change in trim which tends to sustain the divergence. This effect increases the need to monitor attitude carefully in order to prevent divergence from the desired flight path. This need is particularly noticeable in the approach phase and is also noticeable in turns.

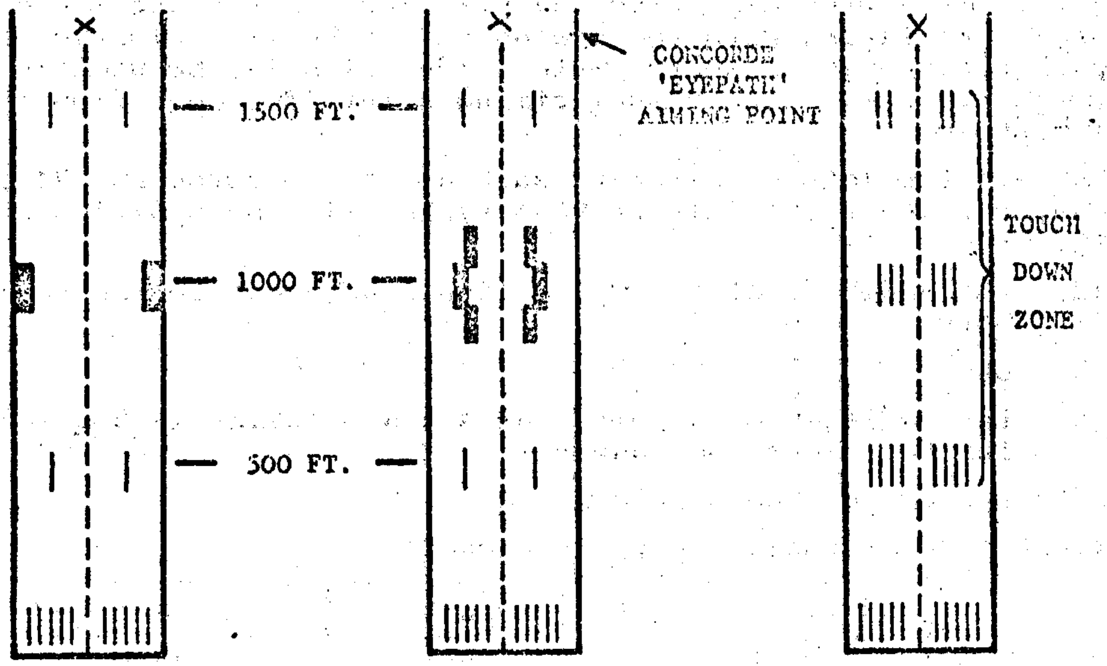
Visual Approach without Glide Slope Guidance - The vertical distance between the path followed by the pilot's eyes and that of the main landing gear is approximately 40 feet with the aircraft in the approach attitude on a 3^{o} approach path.

Where an approach has to be made without any glide slope guidance, these eye/wheel characteristics should be borne in mind, and whatever means are available, DME, geographical features, INS etc, should be used to determine the distance from touch down in order to establish at least initially, a 3^{o} slope to the touch down area. For a given height, the distance in nautical miles to commence a 3^{o} glide path is found by dividing the height in hundreds of feet by 3 e.g. at 1500 feet, the descent should be commenced 5 nautical miles from touchdown.

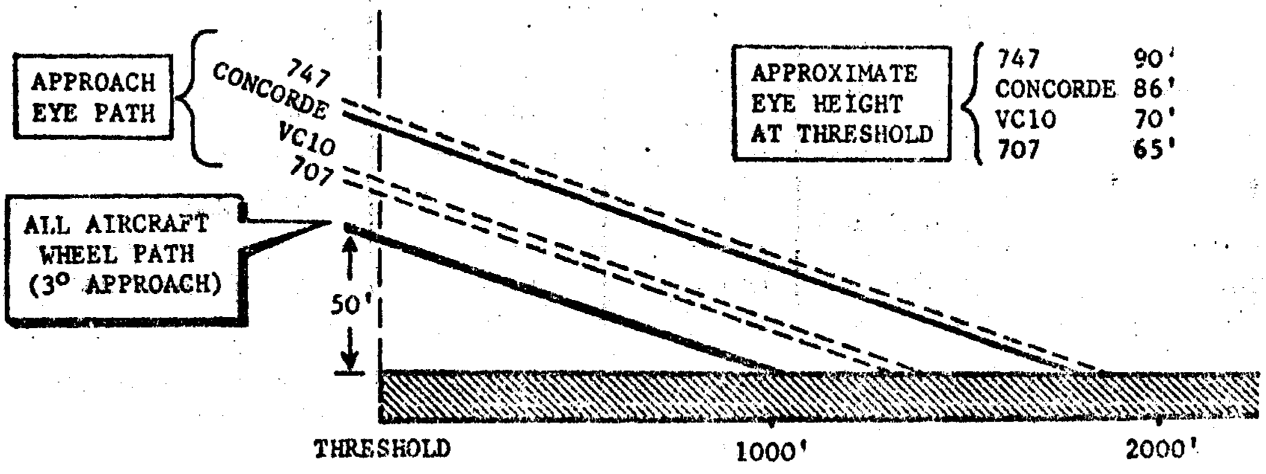
On an approach, the ground speed in knots multiplied by 5 gives the rate of descent in feet per minute approximately equivalent to a 3^{o} glide path.

The sketch of typical touchdown zone markings is included as a reminder. Until pilots are familiar with the vastly increased pilot eye height at touchdown there will naturally be a tendency for the wheels to touch short of the desired area. On the correct Concorde glide slope, the pilot eye path will intercept the runway at a point about 1800 feet from the threshold. The approach eye path illustration shows approximate measurements only but is intended to highlight the problem and danger inherent in visual approach judgement on Concorde. As can be seen the situation is almost exactly analogous to the 747.

TYPICAL TOUCHDOWN ZONE MARKINGS



NOT TO SCALE



Visual Approach Slope Aids - Long Bodied VASIs and T type VASIs may be used in exactly the same way as that described in the Aerodrome Folders for 747, the pilot's eyepath on Concorde is virtually the same as that on the 747.

On Standard VASIs a RED/RED indication will put the aircraft short of the runway; a RED/WHITE 2½°-3° slope may also be too low at the threshold. The 747 practice (when using standard VASIs) of flying with the upwind VASI a WHITISH PINK (a little pink behind) is an approximate guide which may be used in conjunction with the visual aiming point 1800 feet from the threshold.

To assist pilots of aircraft such as the Concorde and 747, at many airfields the Calvert VASI system will be modified either by:

(a) the addition of two white lights adjacent to the upwind bars.

OR

(b) the addition of a third bar set approximately 500 feet further along the runway.

With system (a) the displays are:-

(left side of runway only - depicted)

	Additional Lights		Upwind	Angle from
	Outer	Inner	VASI	Lights
High	BRIGHT WHITE	BRIGHT WHITE	PINK	3⅛° +
On Glide Slope	BRIGHT WHITE	DIM WHITE	RED	2⅞°-3⅛°
LOW	DIM WHITE	OFF	RED	2⅝°-2⅞°
UNSAFE	OFF	OFF	RED	Less than 2⅝°

With system (b) the two upwind bars should display red and white lights when on Concorde glide slope; the near downwind bar should always appear white.

If the nose of the aircraft is not almost over the threshold at the "50" foot call point, the descent must be checked immediately (and power applied as necessary if Autothrottle not engaged) Dragged in approaches are unsafe; do not deliberately aim to touch down on the first 500 feet of the runway.

Noise Abatement - Noise and fuel consumption are both greatly increased at low speed. It is therefore important to carefully plan and monitor descent and speed reduction, avoiding prolonged low altitude or low speed flight.

Reduced Noise Approach - The object of this type of approach is to reduce noise whilst saving both time and fuel. It will, therefore, constitute a high precentage of all Concorde approaches.

Limitations - 1. ILS glide slope guidance must be available

2. The approach must be:-
   (a) A manual approach using ILS glide slope guidance
   (b) A manual approach using FD in GLIDE mode
   (c) An AP approach in GLIDE mode

   NOTE: glide mode is used rather than Land Mod because of the difference in pitch authority laws between the two modes.

3. Surface wind limitations - in (a) above, normal landing limits apply: in (b) and (c) above, the headwind limit and the crosswind limit are both 25 kts.

4. $V_{TT} = V_{REF}$ + 7 Kts + wind correction as appropriate, up to V_T MAX of V_{REF} + 10 Kts.

5. Aircraft configuration must be such that a V_{REF} Abnormal Increment does not apply (e.g. 3 engines).

6. The weather must be such that there is high probability of visual contact with the runway by at least 500 ft R.A.

7. Both ATs must be engaged at the beginning of an approach.

8. Minimum height for use of AP or FD is 200 FT R.A.

   NOTE: When using beams with a shallow glide slope angle (less than 2.7°) in winds above 15 kts, the minimum height for use of AP or FD is 300 ft.

Procedure - Upon reducing to 190 Kts engage AT in IAS HOLD and Maintain 190 Kts to 800 ft R.A. V_{TT} should then be preset in the IAS ACQ window and cross-checked. ($V_{TT} = V_{REF}$ + 7Kts + wind correction as appropriat up to V_T MAX of V_{REF} + 10 kts).

At 800 ft R.A. engage AT IAS ACQ mode. Should inertial ground speed be greater than 220 kts at 1000 ft R.A. then IAS ACQ should be engaged at tha point.

At 500 ft R.A. the co-pilot will check glide slope speed and AT activity are satisfactory and call "Stabilised", or that parameter if unsatisfactory (e.g. "Glide Slope"). Power will normally start t increase at approximately V_{TT} + 10 Kts.

At 300 ft R.A. the co-pilot will call, "Autopilot" if either AP or FD is still engaged. This is a reminder to the handling pilot that the AP and FD must be disengaged by 200 ft R.A. on this type of approach.

Finally - As with other aircraft, the emphasis is on establishing the 'slot' at the correct time and reliance on the radio altimeter to determine flare height; avoid cramped or rushed patterns or procedures. Use all available aids and when possible use the runway that offers the greatest safety having regard to the length, surface conditions, wind, weather and facilities available.

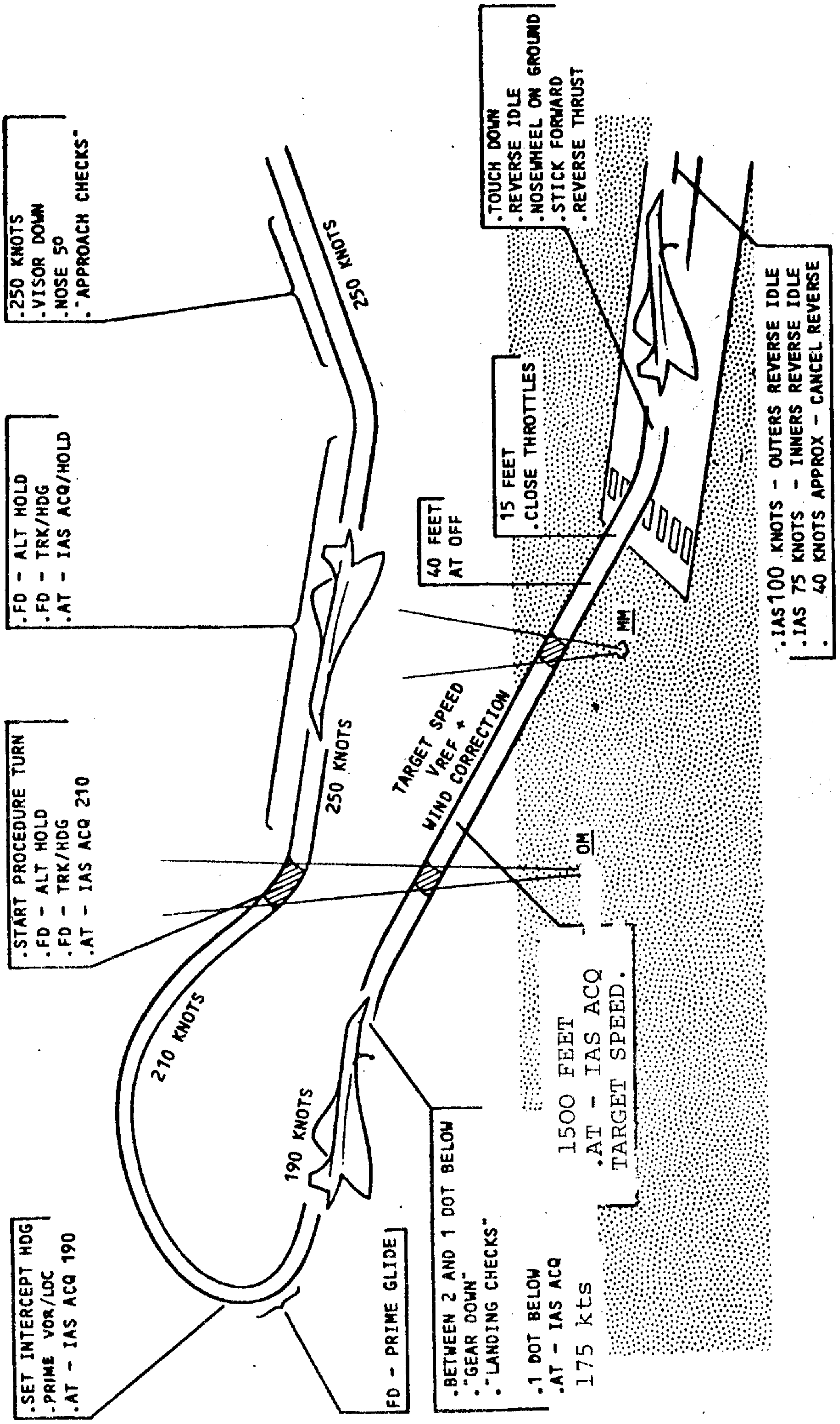
The Golden Rules bear reiteration:

(a) ADHERE TO RECOMMENDED TECHNIQUES.

(b) DON'T TRY TO SALVAGE A POORLY PLANNED OR EXECUTED APPROACH OR ONE THAT DOESN'T LOOK RIGHT AS THE THRESHOLD IS APPROACHED: IT IS SAFER TO GO AROUND AND START THE APPROACH AGAIN.

APPROACH AND LANDING

4 ENG. ALL WEATHER ILS



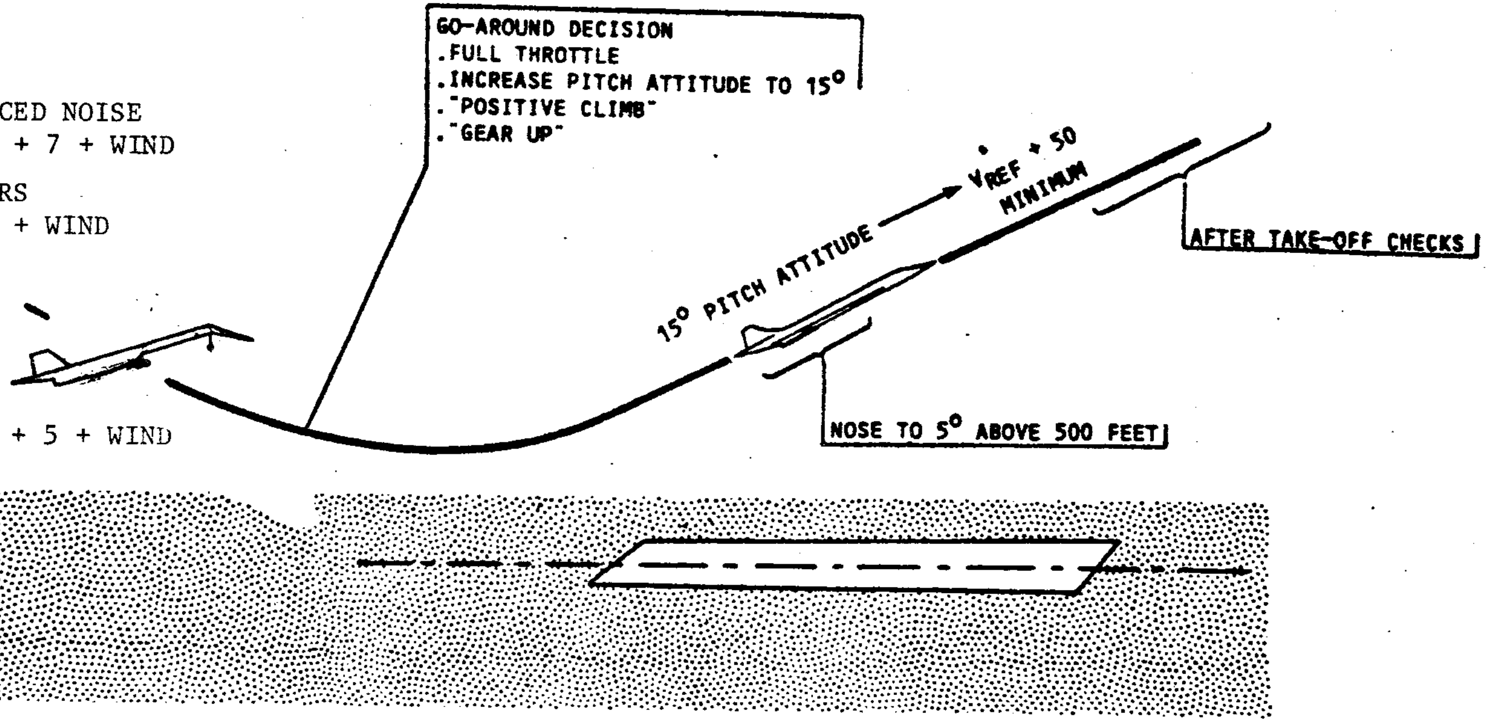
4 ENG ALL WEATHER ILS APPROACH AND LANDING

APPROACH AND LANDING
4 ENGINE AND 3 ENGINE GO-AROUND

4 ENG: REDUCED NOISE
$V_{REF} + 7 + WIND$
OTHERS
$V_{REF} + WIND$

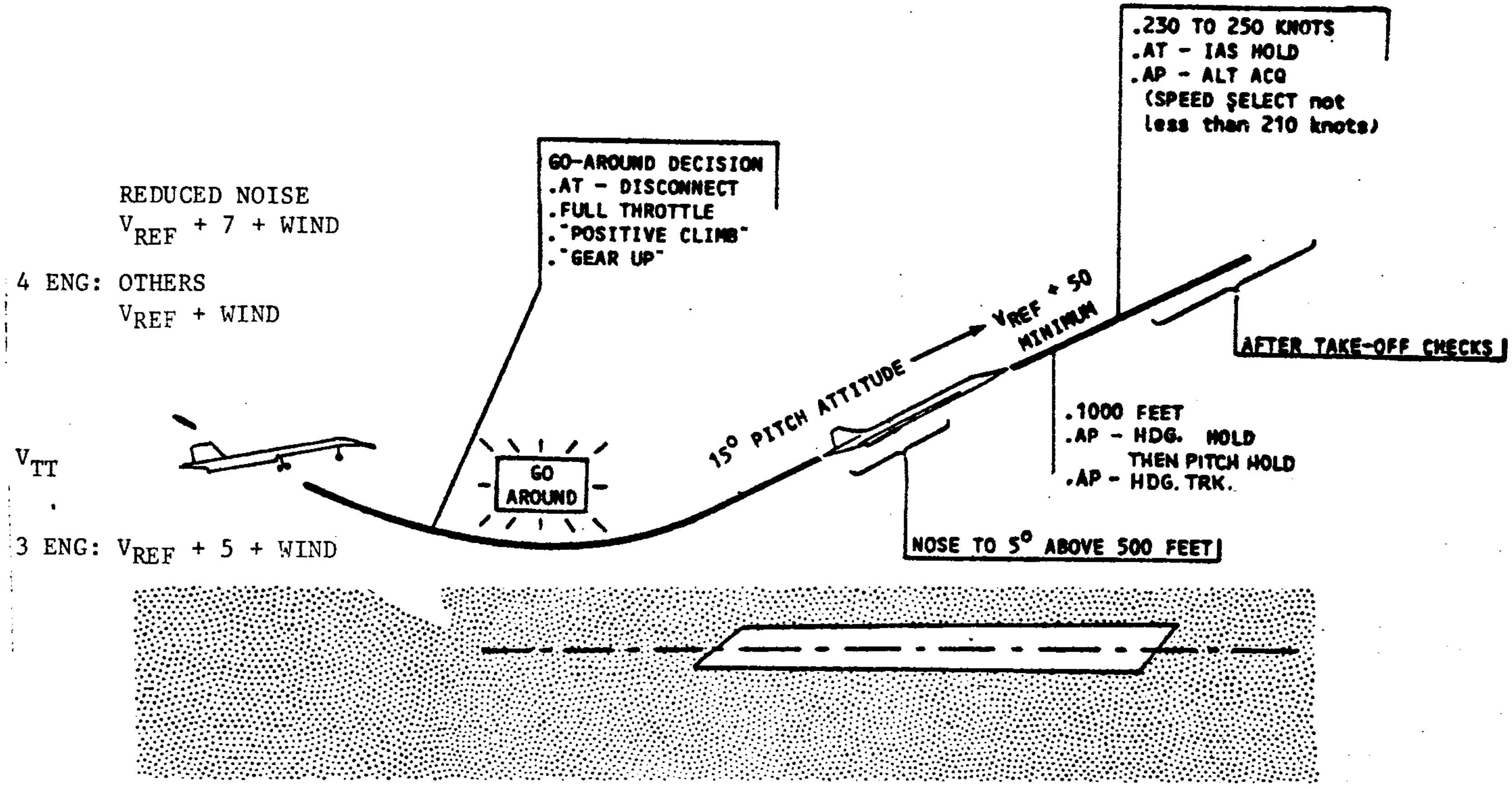
V_{TT}

3 ENG: $V_{REF} + 5 + WIND$



4 ENGINE AND 3 ENGINE GO-AROUND

APPROACH AND LANDING
AUTOPILOT GO-AROUND



AUTOPILOT GO-AROUND

INSTRUMENT FLIGHT

Instruments - A noticeable difference on Concorde is the high pitch attitudes used in low speed flight. The pilot quickly adjusts to this when particular attention is paid to the new pitch datums.

The ADI pitch scale is expanded in the normal range and marked in 1° increments. Close adherence to recommended pitch attitudes and constant attention to 'pitch attitude flying' will ensure accuracy and safety of the highest standard. The pitch index is set for take off at the screen pitch attitude for three engines. This index is useful when hand flying, it should be habitually set to the currently required pitch attitude.

The incidence meter may be used to assess the pitch attitude for level flight. At a particular height and airspeed (1G flight) the required pitch attitude is equal to the incidence. On a 3° glideslope the pitch attitude is 3° less than the incidence.

Due to the large speed range of Concorde the ASI pointer indications are on a small scale. For accurate airspeed control it is necessary to use the digital readout.

Pressure altimeters are set to airfield QNH for landing. Interpretation requires special care by pilots previously flying aircraft utilising QFE.

Transfer Switches - The Transfer Switches should always be in the normal position, unless changeover is required by a failure.

Flight Directors - Whenever possible, to achieve optimum monitoring, the Flight Directors should be selected to their own separate computers.

Use of the Flight Director during take off and initial climb is not authorised; use ADI and HSI as the primary reference instruments.

When bank angles of less than 30° are required (high speed, or two engines) the Flight Director should not be used in a roll command mode. In particular the Director should not be used during a two engine approach because of: excessive bank demand, incorrect GO AROUND attitude, and possibility of inadvertent GO AROUND on approach if the throttles are opened fully.

Autothrottle - It is a good practice to select Autothrottle to standby whenever ALT ACQ is selected (providing Auto Pilot/Flight Director is in a speed mode) in subsonic flight.

Autothrottle controls speed accurately but has a destabilising effect on the aircraft. Pilots should be aware of this but with a good scan and attention to pitch attitude it is no problem.

nchanged)

Radios - Always use radios to optimum advantage. The primary approach aid must be set and identified on two receivers (ADF, VOR or ILS). When tracking on VOR or ADF use two receivers unless one is required for an inter-section check.

Linear Holding - For an equivalent delay, linear holding requires 50% less fuel than stack holding. This procedure should therefore be used when the commander is confident that a delay is required and he can obtain ATC clearance.

INSTRUMENT FLIGHT

Stack Holding - Due to Concorde's higher holding speeds it is essential to monitor all parameters closely to ensure that the aircraft stays within the holding area.

For economy, speeds should be as high as airmanship and ATC considerations permit.

ILS - The Flight Director will normally be used for all ILS approaches but as with other aircraft it is essential that the pilots also monitor the raw data.

Localiser capture is "all angle" with a recommended intercept angle of between 20° and 60°. Establish an intercept heading using ALT HOLD and TRK/HDG modes, reduce speed to V_{REF} + 30 (minimum 190 kts) with Autothrottle in IAS ACQ, then prime VOR LOC.

The command to turn onto the localiser should be carefully watched, as the Flight Director may require immediate response to accomplish this without overshooting the centre line. The interception should be monitored by additional facilities e.g. ADF.

When on the localiser prime GLIDE.

Approaching the glideslope will be indicated by the glideslope pointers of both ADI and HSI. Interception of the glideslope will be indicated by the lowering of the pitch command bars plus the GLIDE caption becoming illuminated.

Upon interception of the glideslope, start descent and at 1500 feet reduce speed to V_{REF} plus wind allowance.

(Deletion)

EMERGENCY DESCENT

Power Reduction - Emergency descent is initiated by rapid power reduction to flight idle thrust. The autopilot should be disconnected.

Fuel Transfer - At the same time as the power reduction, the fuel "FORWARD TRANSFER" switch on the pilot's overhead panel is put to the forward position until such time as the Flight Engineer can take over control of the fuel transfer.

Pitch Attitude - Above FL.500 attitude should be 5.5° below the horizon.

As soon as FL.500 is achieved pitch should be adjusted to 0°, to avoid excessive speed. This is maintained until V_{MO} is reached, after which the pilot holds V_{MO}.

Speed - During the descent from FL.500 to FL.400 at the recommended attitude of 0°, IAS will normally be less than V_{MO}. At FL.440 this difference may be as much as 50 knots but because V_{MO} then decreases rapidly with decreasing height, the difference between IAS and V_{MO} soon becomes smaller. When IAS is equal to the constant V_{MO} (380 to 400 knots depending on weight) the attitude can then be changed by the pilot to maintain the speed. The descent is then continued at V_{MO}.

Trim - At high supersonic speed, the change in trim which occurs with rapid power reduction induces a decrease in attitude. If no corrective action is taken, the attitude change could become excessive.

It is necessary therefore to re-trim in order to avoid exceeding 5.5° below the horizon, and to re-trim again when the attitude is changed to 0°.

Pitch Down Tendency - At V_{MO}, there is a strong tendency to pitch down as the Mach number decreases between Mach 0.97 and Mach 0.93. The use of electric trim is recommended to counteract this tendency.

Audio Warning - The audio warning given when speed exceeds $V_{MO}/M_{MO}/T_{MO}$ Limits is also given when pitch attitude is more than 6° $V_{MO}/M_{MO}/T_{MO}$ below the horizon at speeds greater than Mach 1.00.

NOTE

This manoeuvre is also a deceleration, hence the emergency FORWARD TRANSFER. Reference to the flight envelope will explain the changing pitch datums. Initial throttle closure produces a marked nose down pitch change such that it is a question of exceeding 5° nose down pitch rather than achieving it. (5.5° is maximum super sonic nose down pitch).

As with other aircraft it is important to cross check heights on descent, with Concorde it is additionally necessary to check Mach number and CG.

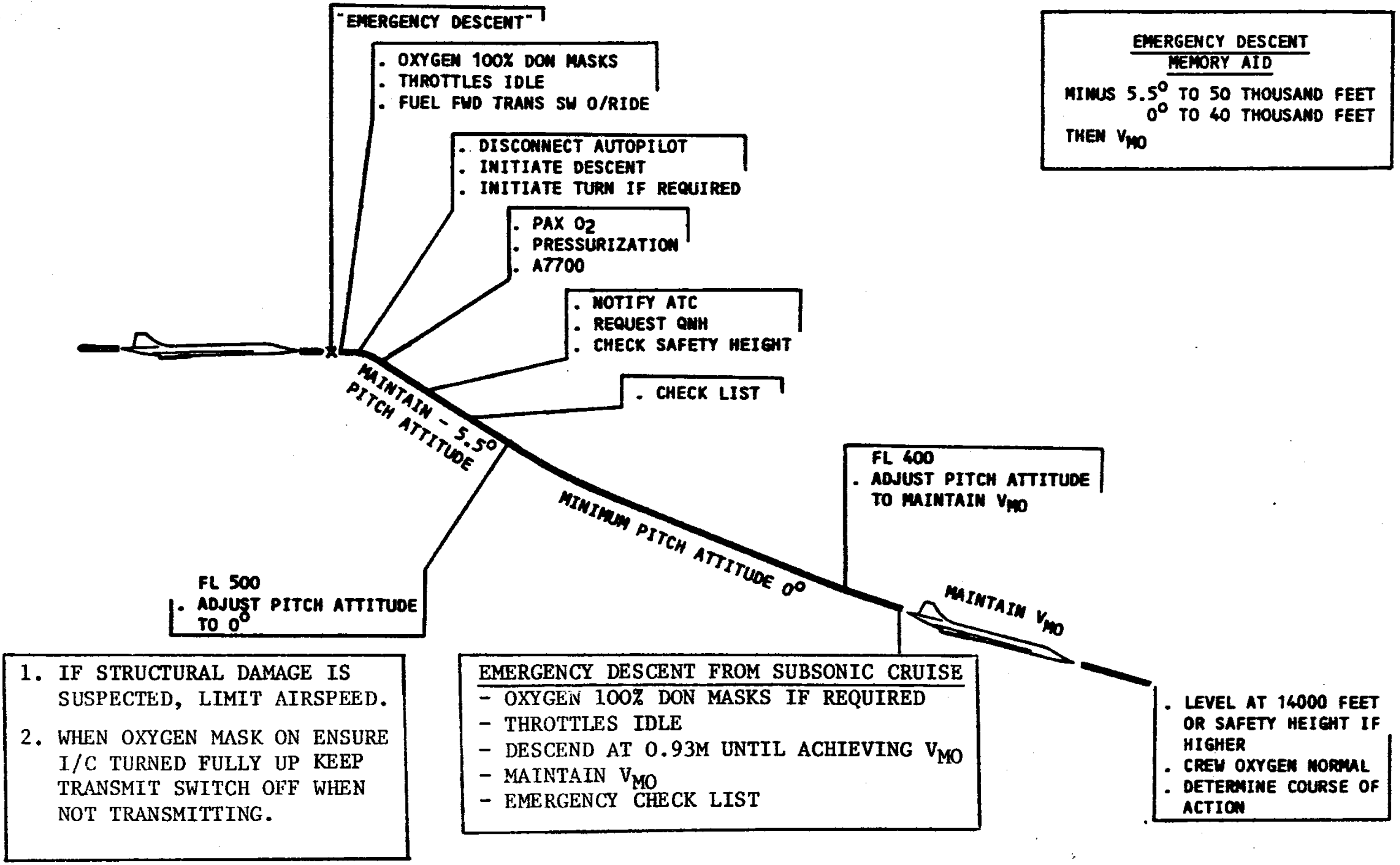
A7700 should be selected on transponder.

When time is available the Emergency Descent and deceleration checks should be carried out.

Average rate of descent is 7000 f.p.m.

(Unchanged)

EMERGENCY DESCENT


"EMERGENCY DESCENT"
. OXYGEN 100% DON MASKS
. THROTTLES IDLE
. FUEL FWD TRANS SW O/RIDE
. DISCONNECT AUTOPILOT
. INITIATE DESCENT
. INITIATE TURN IF REQUIRED
. PAX O2
. PRESSURIZATION
. A7700
. NOTIFY ATC
. REQUEST QNH
. CHECK SAFETY HEIGHT
. CHECK LIST
MAINTAIN - 5.5° PITCH ATTITUDE
FL 500
. ADJUST PITCH ATTITUDE TO 0°
MINIMUM PITCH ATTITUDE 0°
FL 400
. ADJUST PITCH ATTITUDE TO MAINTAIN VMO
MAINTAIN VMO
. LEVEL AT 14000 FEET OR SAFETY HEIGHT IF HIGHER
. CREW OXYGEN NORMAL
. DETERMINE COURSE OF ACTION

EMERGENCY DESCENT
MEMORY AID

MINUS 5.5° TO 50 THOUSAND FEET
0° TO 40 THOUSAND FEET
THEN V_{MO}

EMERGENCY DESCENT FROM SUBSONIC CRUISE
- OXYGEN 100% DON MASKS IF REQUIRED
- THROTTLES IDLE
- DESCEND AT 0.93M UNTIL ACHIEVING V_{MO}
- MAINTAIN V_{MO}
- EMERGENCY CHECK LIST

1. IF STRUCTURAL DAMAGE IS SUSPECTED, LIMIT AIRSPEED.
2. WHEN OXYGEN MASK ON ENSURE I/C TURNED FULLY UP KEEP TRANSMIT SWITCH OFF WHEN NOT TRANSMITTING.

EMERGENCY DESCENT

(Deletion)

LOSS OF AUTOSTABILISATION

Partial Loss - There is no change in handling characteristics with the loss of one autostabilisation system in any axis.

Total Loss in Pitch - The Mach/CG corridor limits are such that the level of handling quality is excellent with autostabilisation and reasonably good without, but handling becomes more sensitive as the CG is moved aft. For this reason the drill for loss of autostab in pitch includes specific maximum aft CGs for supersonic and subsonic flight. Because of the loss of superstab, the drill also includes an increased target speed.

During rotation on take-off, attitude stabilisation becomes relatively difficult particularly during noise abatement procedures. The possibility exists of pilot induced oscillations (P.I.Os) reaching amplitudes of 1° or 2°.

Without the resistance provided by autostabilisation only light control forces are required. In the normal flight range but particularly at high speeds, even light control forces can produce attitude changes which result in significant variations of height or airspeed. Particular care in accurately trimming the aircraft is required to reduce the tendency to set up pilot induced oscillations.

Power reduction for deceleration/descent causes a strong pitch down movement which must be controlled on the elevons. The power reduction should therefore be made smoothly and gradually.

On the approach the possibility of pilot induced oscillations exists in turbulent conditions. These are not dangerous but can be uncomfortable for passengers, and best damped by releasing the control column momentarily.

The flare should be made with a single smooth backward movement of the control column. There is a possibility of over rotation, therefore a slight under rotation which produces a slightly firm landing is preferable to over rotation followed by a series of increasingly difficult pitch down-and-up phases.

Total Loss in Roll - The absence of damping in roll, particularly in turbulent conditions, may lead to a tendency to over control, but this is easily corrected by releasing the control column momentarily. In supersonic cruise, maximum Mach number is reduced because of the tendency to overbank in the event of an engine failure.

Total Loss in Yaw - Roll/yaw interconnect is lost but throughout the normal flight envelope, rudder can be used to augment roll rate or co-ordinate turns.

Roll demands should be made slowly and smoothly because excessive roll inputs may induce side-slip.

During transonic flight pilot induced oscillations can occur about the roll/yaw axes. This should be dealt with by releasing the controls momentarily and allowing the oscillations to cease.

In supersonic cruise, maximum Mach number is reduced because the auto rudder control which compensates for engine failure at high Mach number is lost. Rudder input should be made carefully to reduce side-slip.

LOSS OF AUTOSTABILISATION

Fixed Gain - The loss of both ADCs results in "fixed gain" operation of all three autostabilisation axes with the autostab switches latched on.

If this occurs after GLIDE Capture and below 1,500 feet (Flight Director or Auto Pilot engaged) the Flight Director and/or Auto Pilot will remain engaged and "fixed gain" gives autostabilisation the same as that found normally at approach speeds.

Other than in the approach case "fixed gain" gives autostabilisation in roll and pitch similar to that found at Mach 0.65 and autostabilisation in yaw similar to that found at Mach 1.4.

Handling in general will be similar to that with normal autostabilisation and very little if any difference noted. However, in heavy turbulence or when unusually large control inputs are made, some slight deterioration in damping may be noted.

Loss of Autostabilisation due to Mechanical Signalling - The loss of electrical signalling results in the loss of autostabilisation to the appropriate elevons even though the autostab switches remain latched on. See MECHANICAL SIGNALLING TO FLIGHT CONTROLS. The flight director is still available.

MECHANICAL SIGNALLING TO FLIGHT CONTROLS

Effect on Autostabilisation - Mechanical signalling causes loss of autostabilisation, therefore the considerations given under LOSS OF AUTOSTABILISATION also apply to flight with mechanical signalling. Depending on the elevons affected, the same restrictions on CG apply to supersonic and subsonic flight and the same restrictions on speed apply to high speed and approach speed. See LOSS OF AUTOSTABILISATION.

(i) Outer and middle elevons in mechanical signalling causes:-

Loss of roll autostabilisation
Loss of half of the pitch autostabilisation (the other half being provided by the inner elevons).

(ii) Inner elevons in mechanical signalling causes:-

Loss of half the pitch autostabilisation (the other half being provided by the outer and middle elevons).

(iii) Rudders in mechanical signalling causes:-

Loss of yaw autostabilisation.

Partial Elevon in Mechanical - With either the outer and middle elevons or the inner elevons in mechanical signalling, there are no further significant handling effects, but damping will be less effective in heavy turbulence.

All Elevons in Mechanical - With mechanical signalling to all elevons, there is a slightly different response to control inputs. More care is therefore needed than that required by the loss of autostab alone. This is particularly noticeable in pitch both in supersonic and in subsonic flight.

Without electrical signalling, there is a barely perceptible lag in elevon response to control input which is sufficient to require anticipation by the pilot. Control movements should be small therefore, and they should be discontinued before achieving the desired result. This anticipation will prevent over controlling. Electric trim can be used to advantage for very small adjustments.

Rudders in Mechanical - With mechanical signalling to the rudders, there is a risk at transonic speeds of pilot induced oscillations in roll and yaw. These are best dealt with by releasing the controls momentarily and allowing the oscillations to cease.

Autopilot - If control signalling changes to mechanical whilst the autopilot is engaged, the autopilot should be disengaged. The controls should be released momentarily to allow any oscillations to cease.

Under certain conditions listed below the autopilot may be re-engaged.

(a) With the rudder and/or inner elevons in mechanical mode.

(b) In stabilised flight with the outer and middle elevons in mechanical mode.

The performance of the autopilot should be carefully monitored, if the performance is not satisfactory it must be disengaged.

MECHANICAL SIGNALLING TO FLIGHT CONTROLS

Pilot Induced Oscillations - Because of the slight lag in elevon response in mechanical signalling, it is comparatively easy to set up oscillations but they are easily dealt with by releasing the controls momentarily and allowing the oscillations to cease.

Accurate trimming in pitch and roll reduces the possibility of pilot induced oscillations and assists the recovery.

LOSS OF BOTH ELECTRIC TRIMS

Effects - Except in LAND mode below 100 feet and in GO AROUND, total loss of electric trim results in loss of both auto pilots.

The loss of artificial longitudinal stabilisation provided by Incidence trim, Mach trim, Speed trim, and Speed minus V_{MO} trim affects:-

(i) The high angle of attack situation

(ii) The transonic region

(iii) Any speed increase or decrease

(iv) Flight above V_{MO}.

Feel and Trim - The aircraft should be manually trimmed using the hand wheel. Static longitudinal stability is degraded and artificial feel is dependent on the pitch trim setting. Any airspeed change or change of Mach number especially transonic, should be monitored closely because of the lack of automatic trim.

CG and Trim - In the cruise, normal procedure is followed. The CG should be controlled within the limits by fuel usage and/or trim transfer so as to maintain a deflection of the Flight Control Position Indicators of between zero and 1° down elevon. The aircraft should be trimmed manually in the normal way by means of the handwheel.

At low speeds there is no change to the CG limits but a forward CG within the limits is recommended to improve longitudinal stability.

NOTE: If the cause of the failure is a jammed system longitudinal trimming will no longer be possible. To reduce out of trim loads on the control column the artificial pitch feel can be disengaged. It should be remembered that by so doing the stick wobbler function will be lost and appropriate recommendations regarding flight without pitch artificial feel must be applied.

LOSS OF ARTIFICIAL FEEL

Loss of One Hydraulic Feel System - Artificial feel is provided by the remaining system so there are no handling considerations. As a precaution in case of further failure, coarse use of the controls should be avoided and the aircraft should be kept in trim.

Above 250 knots the aircraft must be trimmed before any attempt is made to re-engage a failed system.

Spring Rod and Hydraulic Feel - Artificial feel in each axis is provided by a spring rod supplemented (above 200 knots) by one of two hydraulic feel systems. Loss of a spring rod affects handling below this speed. Loss of both hydraulic artificial feel systems in one axis affects handling above this speed.

Loss of Artificial Feel Spring Rod - There is no feel force below about 200 knots. With only the slight friction in the control run to overcome, the controls should be moved with extreme care to avoid over controlling. The autopilot can be used to advantage for approach and landing, and if the auto-pilot is disengaged before landing, extreme care is again necessary.

Total Loss of Hydraulic Feel in one Axis below 200 knots - There are no handling considerations below approximately 200 knots because feel is provided by spring rod without hydraulic assistance whether an artificial system is functioning or not.

With total loss in pitch the protection of the stick wobbler is lost but the target-approach-and-threshold-speed remains unchanged as the remaining anti high incidence protection is still operative.

Total Loss of Hydraulic Feel in one Axis above 200 knots - Control forces are reduced, the aircraft should be flown with caution.

(i) Roll - There are no additional considerations. Coarse roll manoeuvres should be avoided.

(ii) Yaw - Rudder should be used with caution. Only sufficient rudder to prevent side-slip should be used.

There is no hydraulic feel protection against excessive rudder pedal deflection.

At high subsonic speeds this lack of protection is important because rudder pedal movement can produce rudder deflections that could overstress the aircraft, therefore use of the rudder pedals in subsonic flight above 250 knots should be avoided. Any corrections to side-slip should be made by careful use of rudder trim.

At high supersonic speeds side-slip corrections can be made normally with the rudder pedals as saturation of the rudder affords protection.

LOSS OF ARTIFICIAL FEEL

(iii) Pitch - Supersonic flight requires careful handling to avoid coarse control inputs. In order to reduce the pitch demands in turns, bank angle should not exceed 30°. In transonic flight, the need for careful handling is increased because of the changes in pitch, therefore the aircraft should be kept trimmed continually and bank angle limited.

Because handling becomes more sensitive as the CG is moved aft, the drill for loss of artificial feel in pitch includes a max aft CG for subsonic flight.

LOSS OF ONE FLIGHT CONTROL HYDRAULIC SYSTEM

Half Power - Low hydraulic pressure or a servo control spool valve jam can result in the loss of one flight control hydraulic system i.e. the loss of half the power to the flying controls.

Saturation of Flight Controls - It is possible to achieve "saturation" i.e. for the aerodynamic load on a control surface to exceed the power of the servo control.

When large control deflections are required such as in the transonic region or in turns, saturation is more likely to occur with the flying controls powered by a single hydraulic system.

When an inner elevon is saturated, the inner elevon light illuminates. This light also illuminates in the case of linkage failure. (See "Loss of an Inner Elevon," page 08.28.08).

Mach/CG - Although half power to the flight controls is taken into account in the construction of the Mach/CG corridor and is the prime consideration in the transonic portion of the corridor, it is considered prudent to avoid the CG boundaries in order to maintain maximum flying control effectiveness.

Speed - Below Mach 0.93 there are no additional considerations to the normal flight envelope.

Above Mach 0.93 it is necessary to use a speed that avoids the boundaries to maintain maximum flying control effectiveness therefore speed should be reduced to 350 knots and this speed used for the descent to Mach 0.93.

Re-pressurising - A flight control system may be re-pressurised but it is essential to have the controls in a non-saturated condition. Re-pressurising should be carried out in level flight with the aircraft in trim.

Rudder - It should be noted that even with two hydraulic systems operating normally, it is possible for the rudder surfaces to become saturated at high supersonic speeds. This saturation in addition to hydraulic artificial feel, protects against excessive rudder deflection.

TOTAL LOSS OF AUTOTHROTTLE

Levelling After Descent - Reaching and maintaining a level after descent requires that the correct power for the desired speed should be applied at the appropriate time to prevent an unwanted loss of speed or altitude.

Throttle Handling - Throttle handling at speeds above the minimum drag speed requires no particular mention.

Below the minimum drag speed, the characteristics of power required in relation to speed become reversed and a reduction in speed requires an increase in power to maintain the flight path. The power required for a speed below the minimum drag speed is also capable of giving stable speed conditions at a higher speed above the minimum drag speed.

Speed Correction - As the approach and landing are made at speeds where these characteristics of power and speed are more pronounced it is therefore wise to correct any undersired speed variation greater than 5 knots as soon as possible. This should be done by increasing the power boldly in the case of an undesired speed reduction or by decreasing the power boldly in the case of an undesired speed increase. In either case follow-up action is required in the form of resetting the power to an intermediate position and making small adjustments.

Approach Speed - With no autothrottle, the speed on final approach should be V_{REF} + 7 knots + wind correction with a maximum threshold speed of V_{REF} + 17 knots. Below 500 ft maintain VTT.

Dispatch with no Auththrottle - In this case the Landing Distance required for Abnormal Landing Configuration must be determined. This landing distance is based on the assumption that speed on final approach is V_{REF} + 7 knots + wind correction and on the assumption that the maximum-threshold-speed is VREF + 22 knots.

ENGINE FAILURES

ENGINE FAILURE DURING TAKE-OFF BEFORE V1

Action - When the failure is identified the captain calls "abandon", closes the throttles, applies maximum footbrakes, holds the control column forward and applies full reverse thrust as quickly as possible on all engines.

The pilot should hold the control column forward initially, but the co-pilot should then confirm this by holding it forward during the application of reverse.

At 100 knots reverse idle is selected on two engines so as to leave full reverse thrust on two "live" symmetrical engines until 75 knots. Reverse idle is then selected on these remaining engines. At 40 knots all engines are selected to forward idle.

Braking is the primary means of stopping but the aircraft is certified using reverse thrust in addition.

NOTE: Prior to take-off the pilot must be absolutely clear about what engine conditions will require him to abandon.

Once the take-off roll is under way with full thrust Flight Engineers must not announce minor or unimportant faults or instrument failures such as could cause confusion or risk unnecessary aborting of the take-off.

It is essential that a firm forward pressure is maintained on the stick to prevent the nosewheel leaving the ground.

ENGINE FAILURE DURING TAKE-OFF AFTER V1

Action - When the failure is identified, contingency power on all engines is selected by the Flight Engineer. The T/O light on the engine rating mode annunciator is extinguished by this selection and the CTY light comes on steady.

Auto Contingency - A flashing CTY light indicates that N_2 has fallen below 58% on an engine and that contingency power has been automatically selected on all engines. Contingency power should be selected on all engines as a confirmatory action. The CTY light then stops flashing and becomes steady.

Having confirmed contingency power following an automatic contingency selection, it is necessary to pull out the take-off monitor control button so that take-off rating can be re-selected when required.

Rotation - If the failure occurs whilst the aircraft is on the runway, rotation is initiated at V_R at a slower rate than usual. The rate of pitch attitude increase should be controlled so as to achieve simultaneously the V_2 speed and the initial climb out attitude, θ_2.

A slower rotation is required on three engines because the rate of increase of airspeed is noticeably less than on four engines and becomes even less after lift off which occurs 2 or 3 knots before V_2 and at about 10° pitch attitude.

ENGINE FAILURES

Gear - The command "gear up" should be given when a positive climb is established. A positive climb should not be considered established until the radio altimeter is indicating more than 20 feet

Failure to retract the gear causes a performance penalty of 400 f.p.m. rate of climb.

Speed - On achieving the initial attitude θ_2, the speed should be V_2. This speed is maintained until commencing the horizontal acceleration to V_2 + 40 knots. When the gear is up, a small attitude increase of about 1° is required to maintain V_2.

If however, after rotation to θ_2, a speed higher than V_2 is achieved because the engine failure occurred at a speed close to V_2 or because the power loss was gradual, or because weight is not limiting, the higher speed should be maintained until the horizontal acceleration to V_2 + 40 knots is commenced. The higher speed gives a better climb-out gradient with less induced drag.

A rotation carried out too rapidly results in too low a speed and reduced performance margins, therefore any tendency to rotate too quickly must be corrected. However, if it happens and a speed below V_2 is obtained, this achieved speed must be maintained until the horizontal acceleration to V_2 + 40 knots is commenced.

Directional Control - Directional control should be maintained with rudder. As the speed increases following engine failure at V1 or above, a reduction in the initial rudder application will be required for the climb-out. After rotation when the initial climb-out is established, it is necessary to achieve zero side-slip for the best engine-out climb performance. A small amount of bank (approximately 2° or 3°) is then necessary to maintain a constant heading.

Power Limitations - Accurate timing of engine rating selections would ideally commence at the time of selection, but this is impractical for timing contingency rating following engine failure on take-off. The maximum time limitations will not be exceeded by using the time measured from the start of take-off as follows:-

After 3 minutes reselect take-off rating by selecting reheat.

After 7½ minutes select reheated climb power by selecting Flight Rating.

After 22½ minutes select reheats off.

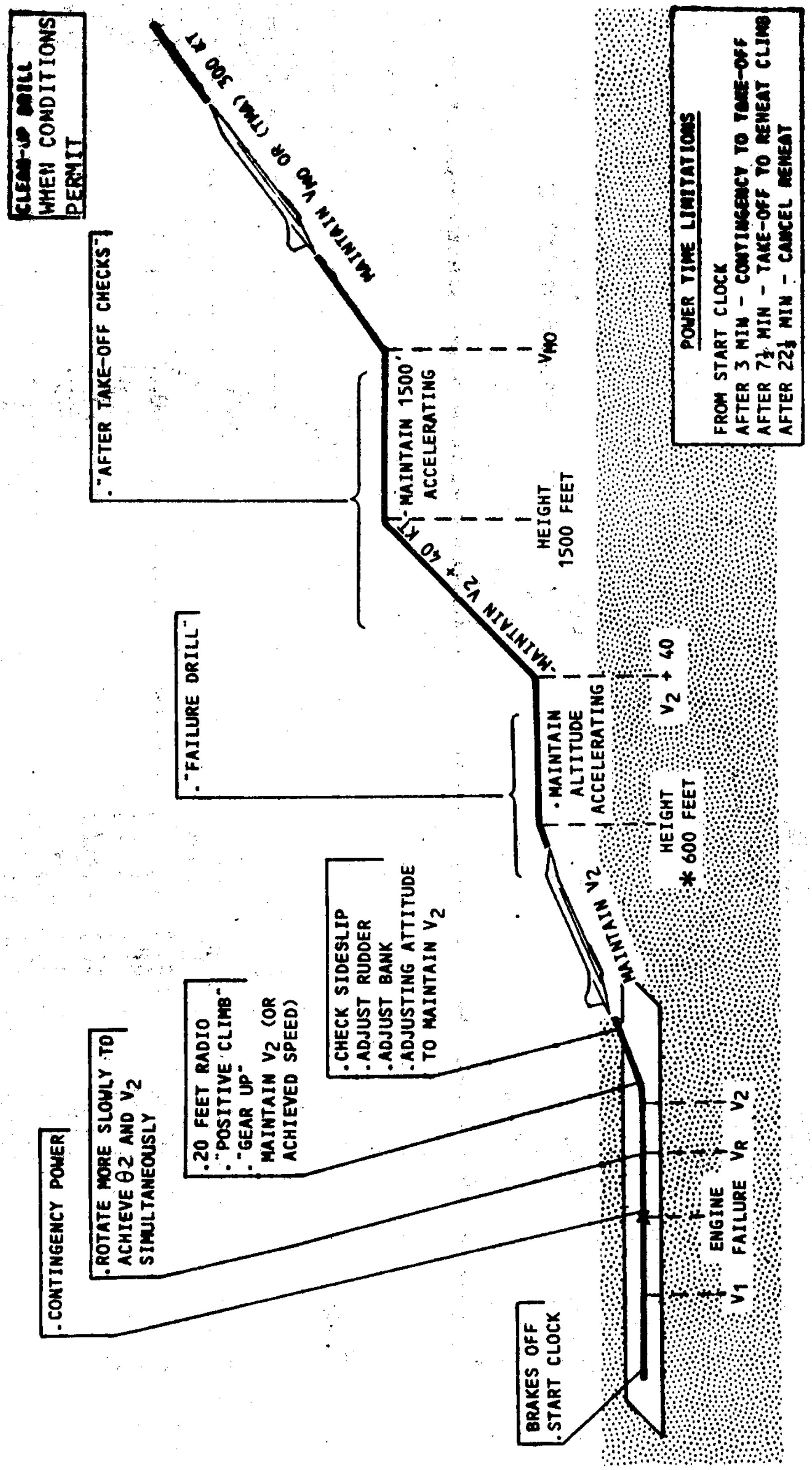
Turns - Where possible turns should be avoided because of the increased angle of attack required and the consequent increase in induced drag. However, a turn at V_2 with 15° bank gives approximately the same climb performance as a conventional four engine aircraft with one engine out and wings level.

En Route Climb Speed - The scheduled en route climb speed is V_{MO}. The acceleration from V_2 + 40 knots is made in level flight at 1500 feet.

When manoeuvring in terminal areas prior to fuel jettison a speed of 300 Kts, not less, is recommended.

(Unchanged)

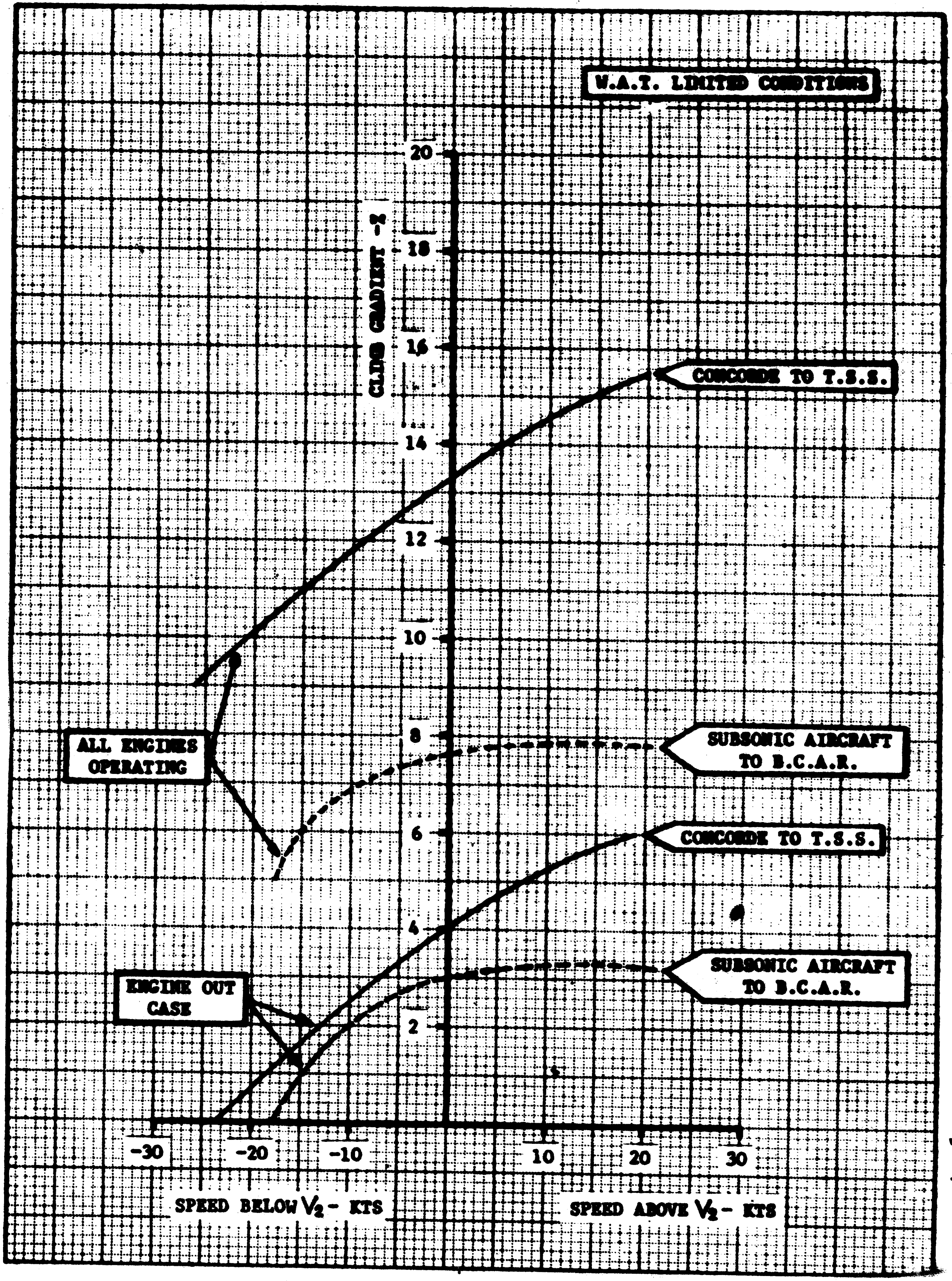
ENGINE FAILURE AFTER V_1 ALTERNATIVE 1


CLEAN-UP DRILL WHEN CONDITIONS PERMIT
MAINTAIN V_{MO} OR (IMN) 300 KT
. "AFTER TAKE-OFF CHECKS"
. MAINTAIN 1500' ACCELERATING
V_{MO}
HEIGHT 1500 FEET
. MAINTAIN V_2 + 40 KT
POWER TIME LIMITATIONS
FROM START CLOCK
AFTER 3 MIN - CONTINGENCY TO TAKE-OFF
AFTER 7½ MIN - TAKE-OFF TO REHEAT CLIMB
AFTER 22½ MIN - CANCEL REHEAT
. "FAILURE DRILL"
. MAINTAIN ALTITUDE ACCELERATING
V_2 + 40
HEIGHT
* 600 FEET
MAINTAIN V_2
. CHECK SIDESLIP
. ADJUST RUDDER
. ADJUST BANK
. ADJUSTING ATTITUDE TO MAINTAIN V_2
. 20 FEET RADIO
. "POSITIVE CLIMB"
. "GEAR UP"
. MAINTAIN V_2 (OR ACHIEVED SPEED)
. ROTATE MORE SLOWLY TO ACHIEVE θ2 AND V_2 SIMULTANEOUSLY
. CONTINGENCY POWER
ENGINE FAILURE
V_1
V_R
V_2
BRAKES OFF
. START CLOCK

ENGINE FAILURE AFTER V_1 ALTERNATIVE 1

(Deletion)

ENGINE FAILURES
TAKE-OFF CLIMB GRADIENT COMPARISON



(Unchanged)

ENGINE FAILURES

Performance - Concorde's performance is much more affected by speed and by turns than other aircraft. (V_{ZRC} is greatly increased in turning flight).

Considering the graph "Take off Climb Gradient Comparison". Several relevant facts are apparent:

(1) In both cases Concorde has a much greater increase in climb gradient with increasing speed (ie it is more speed sensitive) therefore if speed inadvertently exceeds V_2, after an engine failure, hold that speed. Do not attempt to get back to V_2.

(2) In the engine out case Concorde gradient is 1% better than the subsonic aircraft at V_2 but at V_2-10 knots this advantage is virtually lost.

(3) The loss in performance due to engine failure is much greater on Concorde than the subsonic jet.

Drills - Engine failure prior to initial climb will be announced as 'Engine Failure'. When the aircraft is safely established in the climb attitude the Flight Engineer should repeat the failure and identify the engine. The appropriate drill should then be called for. Memory drills should be performed slowly, the pilot and Flight Engineer announcing clearly the action to be taken so that each may monitor that the other's action is correct.

ENGINE FAILURE SUBSONIC

Aircraft Behaviour - The reaction of the aircraft is similar to that of a subsonic aircraft and is corrected easily in the conventional manner.

The aircraft is flown with zero side-slip and a small bank angle is required to maintain constant heading.

Speed with one Engine Failed - The optimum speed for best range and for sustaining altitude is Mach 0.95, or V_{MO} if V_{MO} gives a Mach number less than Mach 0.95.

When speed is reduced below V_{REF} + 50, it is recommended that bank angles are limited to 20°.

Double engine Failure - The reaction of the aircraft is similar to that of a subsonic aircraft and is corrected easily in the conventional manner.

The aircraft is flown with zero side-slip and a small bank angle is required to maintain constant heading.

The change of yaw trim with power changes is more marked than in the three engine case.

Speed with two engines failed - The optimum speed for best range and for sustaining altitude is Mach 0.80, or V_{MO} if V_{MO} gives a Mach number less than Mach 0.80.

When a reduction in speed is necessary, 250 knots is recommended where possible. In no case should speeds below V_{REF} + 50 knots be used until manoeuvring is completed and the aircraft is on final approach.

ENGINE FAILURES

ENGINE FAILURE SUPERSONIC

Descent - Descent must be commenced following a single or double engine failure. The descent is carried out using the normal deceleration and descent procedure and is continued to subsonic flight level.

Aircraft Behaviour - An engine failure at Mach 1.60 and above causes the aircraft to bank. The reaction of the aircraft differs from that of a subsonic aircraft because the opening of the spill door on the failed engine projects air downwards thus generating a lift force which raises the wing on which the failure has occurred.

Basic yaw and side-slip reaction are conventional and a slight pitch down is induced. A further pitch down is induced when power is reduced on the live engines to commence descent.

Correcting side-slip and bank - Auto-stabilisation reduces the resulting flight path disturbance. The wings should be levelled smoothly and the pitch down tendency corrected. This correctly controls the aircraft initially and any residual side-slip is corrected by movement of the rudder pedal in the direction of the side-slip index. A small bank angle is required to maintain constant heading.

Rudder loads will be heavy, making it advantageous to use rudder trim at an early stage.

Coarse use of roll elevon should be avoided because the side-slip thus induced could bring the good engines to a condition approaching surge.

As a descent is commenced following engine failure at supersonic flight levels, the power reduction on the live engines decreases the amount of yaw and roll trim required.

Double engine failure - The effect produced by double engine failure is similar, but more pronounced.

Where possible, the aircraft is flown with zero side-slip but on two engines at high supersonic speed there will be a small residual side-slip which is acceptable and is due to insufficient rudder control with cruise power on the live engines. However, as a descent is commenced following engine failure or failures, the power reduction on the live engines decreases the amount of yaw and roll trim required.

Power - Power should be reduced on the live engines in accordance with the normal throttle procedure for deceleration/descent.

Deceleration/Descent - The cruise altitude should be maintained in the deceleration until the speed approaches 350 knots in accordance with the normal procedure for deceleration/descent.

(Unchanged)

Speed with one engine failed - 350 knots should be maintained until Mach 0.95 is reached. The descent to the optimum altitude is then continued at Mach 0.95 unless limited by V_{MO}.

Speed with two engines failed - 350 knots should be maintained until Mach 0.80 is reached. The descent to the optimum altitude is then continued at Mach 0.80 unless limited by V_{MO}.

ENGINE FAILURES

Performance - Unlike most subsonic jets, there is a considerable loss of range on Concorde if an engine failure occurs. From four engine supersonic cruise to optimum three engine cruise incurs a range penalty of 30-35%

The loss of range between four engine cruise supersonic, and four engine cruise subsonic is also significant, in the order of 25%. In addition, in reverting to subsonic flight, be it on three or four engines, the aircraft may well have exchanged an environment with light winds to one with strong headwinds. An associated problem is the drift down into the track of other aircraft, making it essential to be aware of procedures applicable in the area being flown.

It is important that pilots are constantly aware of the course of action that they would take, and alternates available, should an engine failure occur at any time.

A double engine failure produces difficulties of a similar nature but to a much inflated degree.

A technical failure which causes the pilot to reduce from supersonic to subsonic cruise will have similar effects on range to a single engine failure.

NOTE: In the event of a double engine failure a landing should be made at the nearest suitable airfield.

ENGINE FAILURE IN THE APPROACH PHASE

Aircraft Behaviour - The reaction of the aircraft is similar to that of conventional aircraft and is corrected easily in the conventional manner. Induced drag increases rapidly with angle of attack so turns and decreasing speeds or combinations of turns and decreasing speeds require careful monitoring.

3-engine Approach - Both autothrottles should be engaged if available. Traffic speeds are as for four engines but 5 knots is added to V_{REF} for final approach. If autothrottle is not used, 7 knots is added to V_{REF} for final approach. Rudder trim should be set to zero by 500 feet on final approach.

During asymmetric flight, autothrottle movement produces considerable yaw inputs, it may be found helpful to keep a hand on the throttles so that these inputs can be anticipated.

Reverse thrust is used normally on the three live engines except that maximum reverse is used on the available engines down to 100 knots. Reverse idle is then selected on the asymmetric engine and the normal procedure resumed.

The go-around on three engines is similar to that for four engines, but bank angle should be limited to 20°.

2-engine Approach - Autothrottle should not be used. Speeds up to 250 knots may be used in visual traffic pattern in order to reduce noise and fuel consumption, but in no case should speeds below V_{REF} + 50 knots be used until manoeuvring is completed and the aircraft is on final approach. The speed on final should then be reduced to V_{REF} + 30 knots and this speed is maintained until 300 feet or lower.

(Deletion)

The minimum height recommended for go-around is 500 feet.

ENGINE FAILURES

Full dry power will be adequate to maintain the glide slope but if at any time on the approach, speed or altitude is less than that desired, reheat should be used without hesitation plus contingency if required.

2-engine landing - Rudder trim should be set to zero by 500 feet.

Below 300 feet the target speed becomes V_{REF} + 7 knots. The recommended procedure is to continue initially at V_{REF} + 30 knots and at about 300 feet begin to reduce speed, maintaining the glide slope. The pitch attitude required increases by about 3° during this phase. The attitude change must be made so as to ensure that no deviation below the glide slope follows the small reduction in power.

Use of reverse - Normal Reverse should be selected on the two operating engines.

With both operating engines on the same side of the aircraft reverse idle is selected at 100 knots on the outer engine and 75kts on the inner engine.

With an operating engine on each side of the aircraft reverse idle is selected at 75 knots.

Reverse idle is permitted on both engines down to 40 knots.

Second engine failure during 3-engine approach - It is possible that failure of a second engine at V_{REF} + 5 knots during a 3-engine approach may be identified and controlled without deviation from the glide slope, and the speed increased by the required 2 knots with normal power application. However, if the failure results in loss of speed and/or deviation below the glide slope, contingency power should be selected and maintained until the flight path is re-established at V_{REF} + 7 knots on the glide slope. Normal throttling should then be resumed.

2-engine go around - The minimum height for go around is 500 feet.

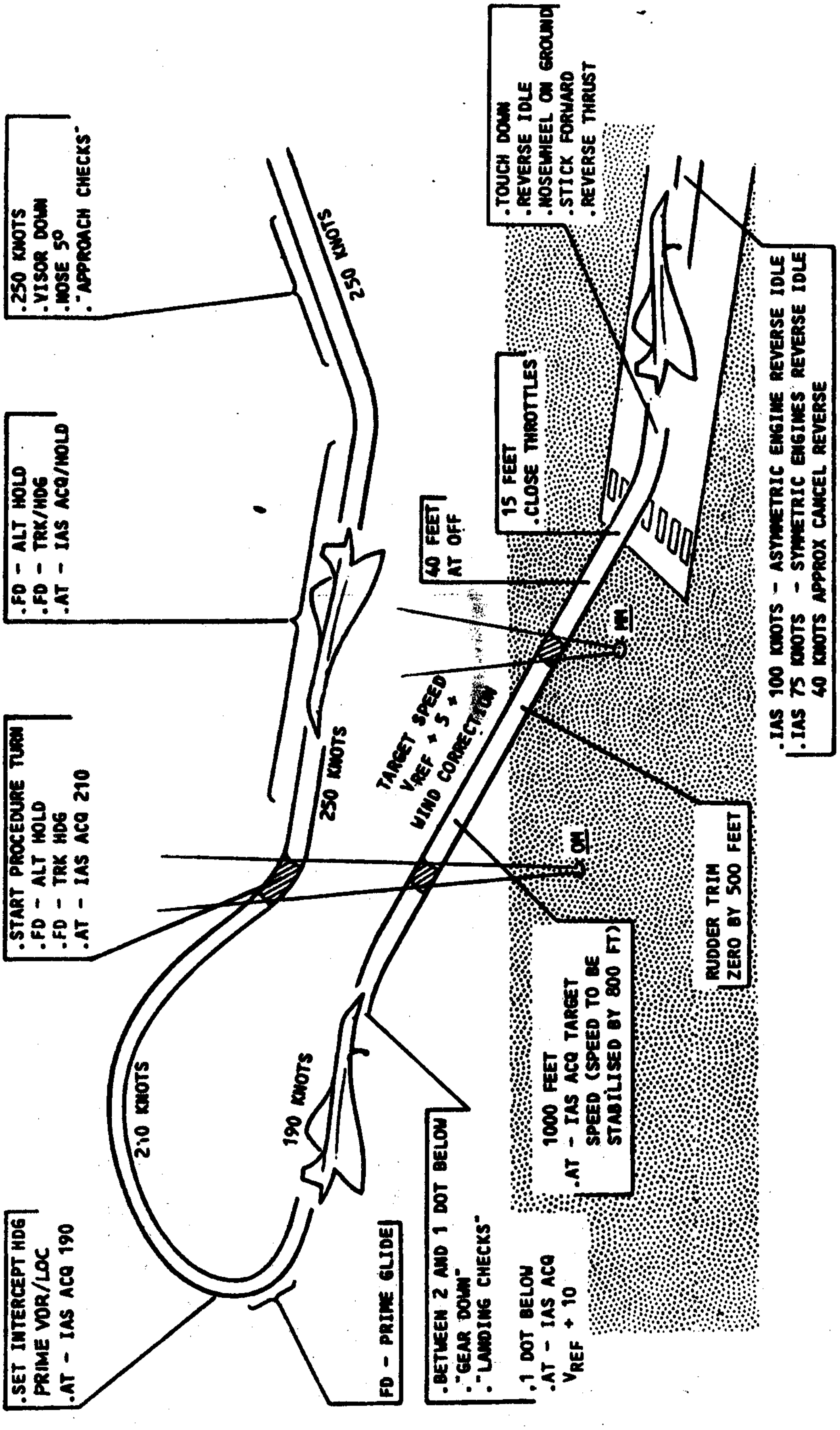
If due to loss of engines or hydraulic pumps the landing gear has been lowered, using the standby system, then the gear cannot be raised. The recommended speed of V_{REF} + 30 knots at 500 feet gives adequate performance even at the landing WAT limit with the gear down.

Maximum contingency power should be applied and the pitch attitude adjusted to arrest the sink whilst maintaining the speed at V_{REF} + 30 knots. This may result in a slight descent initially. When a positive climb is established the gear should, if possible, be raised and the aircraft rotated smoothly to 12° and the climb continued, accelerating to V_{REF} + 50 knots. Bank angle should be limited to 20°.

After 2½ minutes, select Take-off Rating by setting the Reheat selectors from Contingency to Reheat.

ENGINE FAILURES

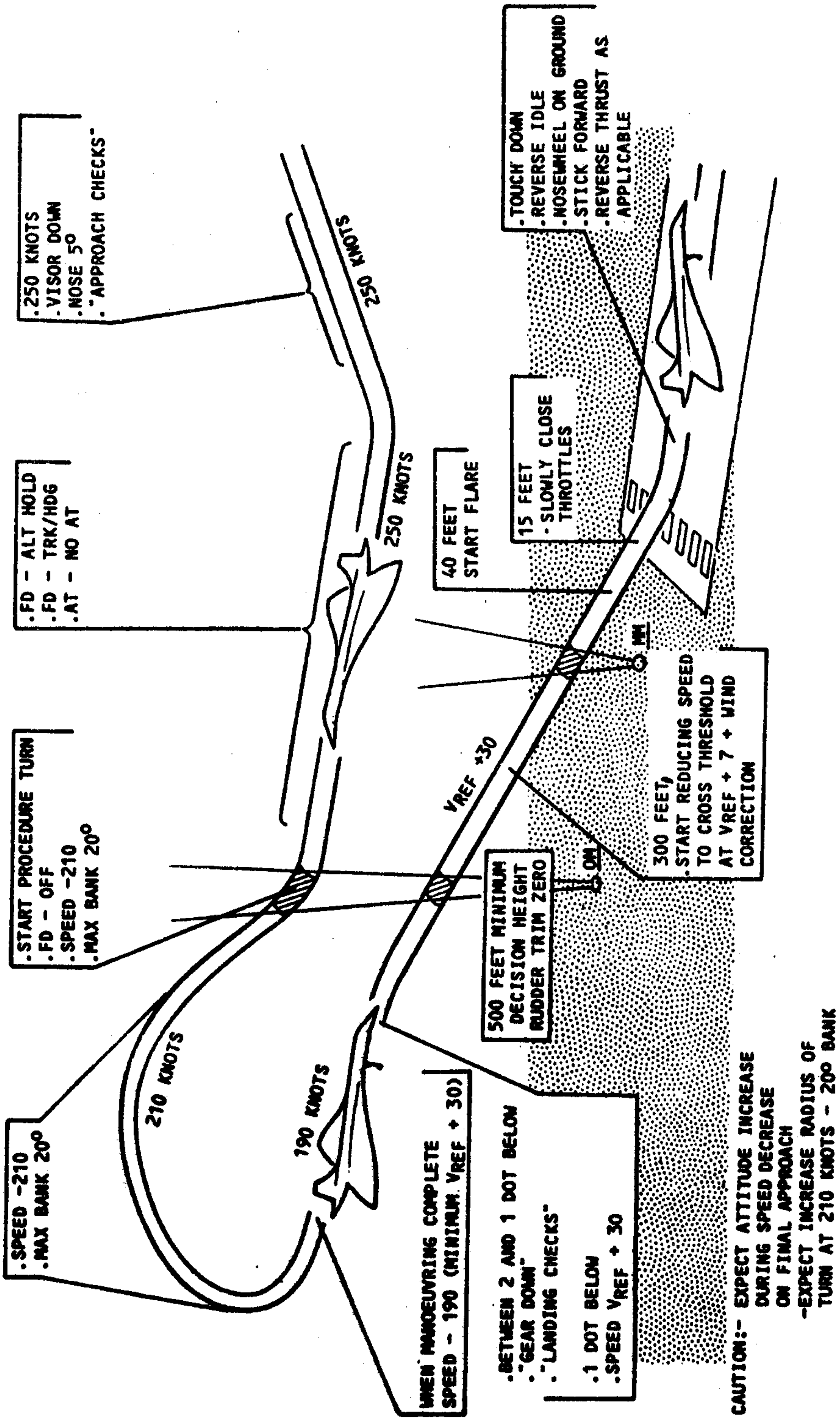
3 ENGINE ILS APPROACH AND LANDING



3 ENGINE ILS APPROACH AND LANDING
MANUAL WITH FLIGHT DIRECTOR

ENGINE FAILURES

2 ENGINE ILS APPROACH AND LANDING

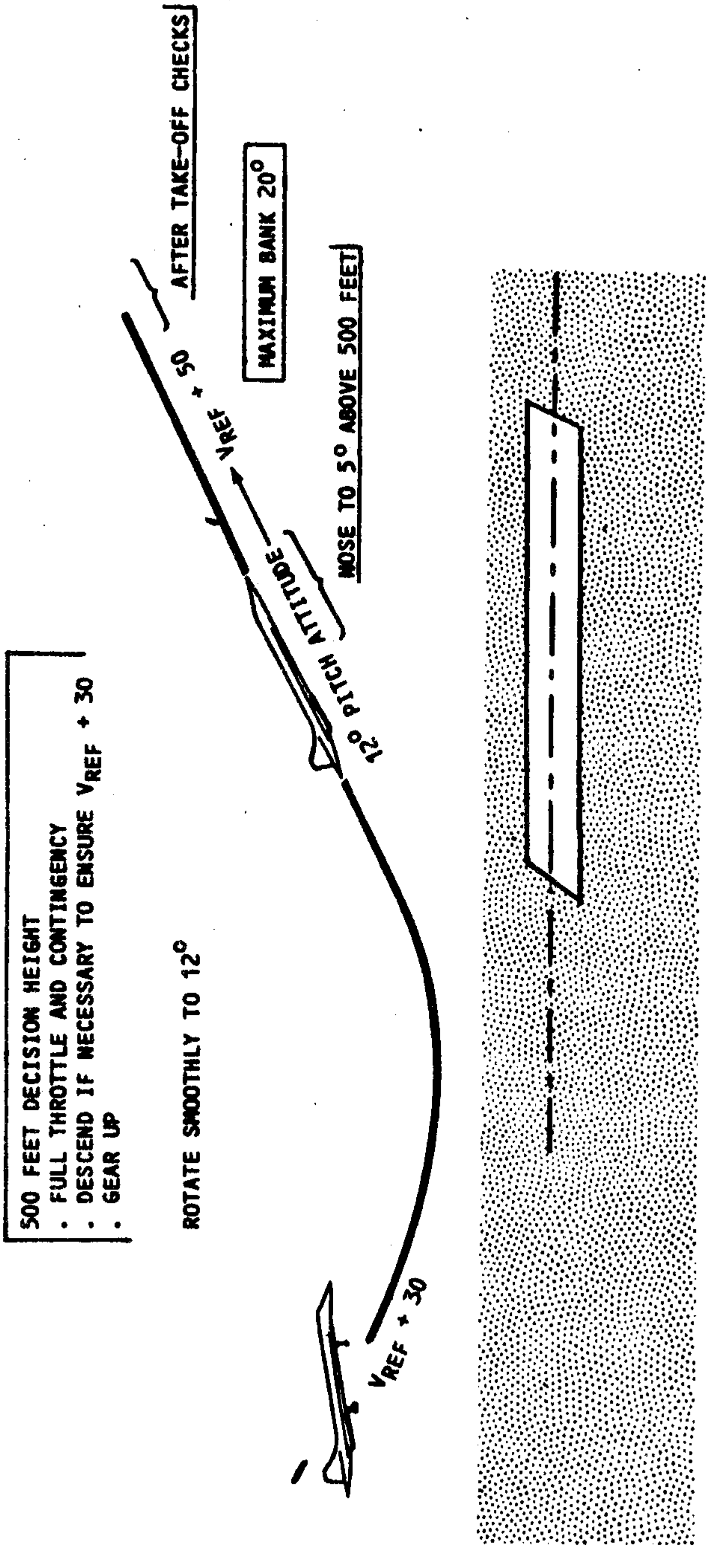


CAUTION:- EXPECT ATTITUDE INCREASE DURING SPEED DECREASE ON FINAL APPROACH
-EXPECT INCREASE RADIUS OF TURN AT 210 KNOTS - 20° BANK

2 ENGINE ILS APPROACH AND LANDING

ENGINE FAILURES

2 ENGINE GO-AROUND



CAUTION - WITH BOTH LEFT ENGINES FAILED
GEAR CANNOT BE RAISED

2 ENGINE GO-AROUND

ENGINE FAILURES

Engine Surge - Surge on a jet engine is caused by a significant break down in flow in the engine compressor(s). On a supersonic aircraft a more complex air inlet and exhaust system is required to give good efficiency, and hence failure of some part of the total powerplant must have a slightly higher probability.

If all systems are working correctly and procedures and limitations are observed surge should not be encountered. The possibility of a failure serious enough to induce surge is remote, but should it occur it is desirable, as on all aircraft, to take prompt action to eliminate the condition.

Recognition - Some thrust loss will inevitably occur when surge is present but this is often not a sufficient indication on its own of the condition. Surge can evidence itself in a sudden change in engine instrument readings alone, but more often is accompanied by a general "roughness" or where higher degree of flow break down occurs, by cyclic 'banging' sound from the engine.

When subsonic little difficulty should be encountered in identifying the faulty powerplant by observation of the engine instruments. When supersonic, however, surge frequently gives little or no indication on the engine instruments but the faulty powerplant can usually be identified by observation of the intake pressure ratio gauges, where it is seen as a fluctuation of the gauge needle as the surge occurs. At Mach numbers greater than about 1.5M identification is further complicated by the fact that surge in one engine can cause a 'sympathetic' surge in its adjacent partner.

Corrective Action - If the surge is other than simply transient in nature the relevant failure drill should be carried out.

Should the surge be only transient and not persist, then the event should be logged and that powerplant carefully monitored, thereafter, where possible making adjustments to power slowly.

If for any reason an engine is throttled beyond the recommended position above M1.6 a mild 'pop' surge may occur during throttling, or any subsequent re-advance of the throttle. Such surges may be disregarded so long as they are not accompanied by unusual instrument readings or failure indications.

EMERGENCY FLIGHT CONTROL

General - The system is fitted to ensure control can be maintained in the extremely unlikely event of a jammed control run between the control column and the relay jack, in either the pitch or roll axis. Since the system operates through the pitch and roll autostabilisation system it cannot provide roll signals to the inner elevons. To prevent disconnection of the flying controls through surface comparator action the comparators are inhibited when the emergency flight control is engaged.

Engagement - The system must only be engaged if there is a total jam or where the required range of movement of the control column cannot be obtained. The system must not be used simply to overcome stiff or heavy control column movement.

At the moment of engagement, the controls must be released in order to avoid sudden and perhaps excessive control input.

Handling - If the roll axis is unjammed, or jammed in a way which allows some movement, roll control will be noticeably more sensitive. This is because the normal control inputs and those of the emergency system will be combined. This increased sensitivity is not apparent in the pitch axis because the emergency system takes account of any normal control input which is available. When operating the control column in the jammed position, the control forces experienced in the direction of the jam are similar to those with the artificial feel system switched off, i.e. only the spring rod operating.

If reasonable care is taken in applying control inputs, good and precise control can be maintained within the authorized envelope.

Should a jam occur in the pitch axis, control forces can be trimmed out in the normal manner. There is no facility for trimming if a jam occurs in the roll axis.

FLIGHT IN SEVERE TURBULENCE

Severe turbulence should be avoided whenever possible. If it cannot be avoided, or is met unexpectedly, the aircraft should be flown at the recommended rough air speed, V_{RA}, speed being adjusted according to weight and altitude.

Above 32,000 ft speeds up to V_{MO}/M_{MO} are permitted. Optimum climb performance is associated with the highest permitted speeds. In such cases, if frequent speed fluctuations occur, it will be necessary to reduce speed below V_{MO}/M_{MO} to avoid "Overspeed" warnings. If performance is not to be significantly degraded during the climb such reductions in speed should be kept to the minimum to maintain the aircraft within the limitations.

Below 32,000 ft the maximum permitted speed in rough air depends on aircraft weight. At weights above 140,000 kgs it is 375 kt; below 140,000 kgs it is 300 kt.

The minimum permitted speed in rough air is V_{LA} or 250 kt which ever is greater. To avoid the risk of excursions below $V_{LA}/250$ kt it may be necessary to select a speed sufficiently above $V_{LA}/250$ kt to provide an appropriate margin for the prevailing conditions.

Alough flight is permitted within the maximum and minimum limits given above, the recommended rough air speed is 300 kt whenever such a speed does not impose unacceptable performance or operational limits.

If severe turbulence is anticipated, that cannot be avoided, adjust air speed to the appropriate value before entering the turbulence. Gross adjustments to speed, power or altitude should be avoided once the turbulence is encountered, and attitude used as the prime flying reference.

If severe turbulence is met unexpectedly, speed should be changed, if necessary, to the desired value carefully, relying more on a correlation of engine power and aircraft attitude than on airspeed, (or Mach number), and altitude readings.

In the cruise if severe turbulence is widespread and continuous, a change in altitude may be desirable. In which case any such deliberate change should be accomplished by a small change in power accompanied by a corresponding small change in pitch attitude.

In all cases the autopilot should normally be engaged. Because of the aerodynamic characteristics of the aircraft, the behaviour in turbulence is better than that of conventional subsonic aircraft, thus usually permitting the use of the normal cruise modes of the autopilot and of the autothrottle, (i.e. Max Climb/Max Cruise or ALT HOLD and autothrottle), whenever overflying or making a lateral avoidance of a known severe storm area. If, however, severe turbulence is encountered o flight near severe storm tops is unavoidable, the autopilot should be engaged in PITCH HOLD without autothrottle engagement. Only if this results in autopilot disconnects need resort be made to use of the TURB mode.

Severe turbulence is particularly to be avoided if autostablisation has been lost in one or more axis.

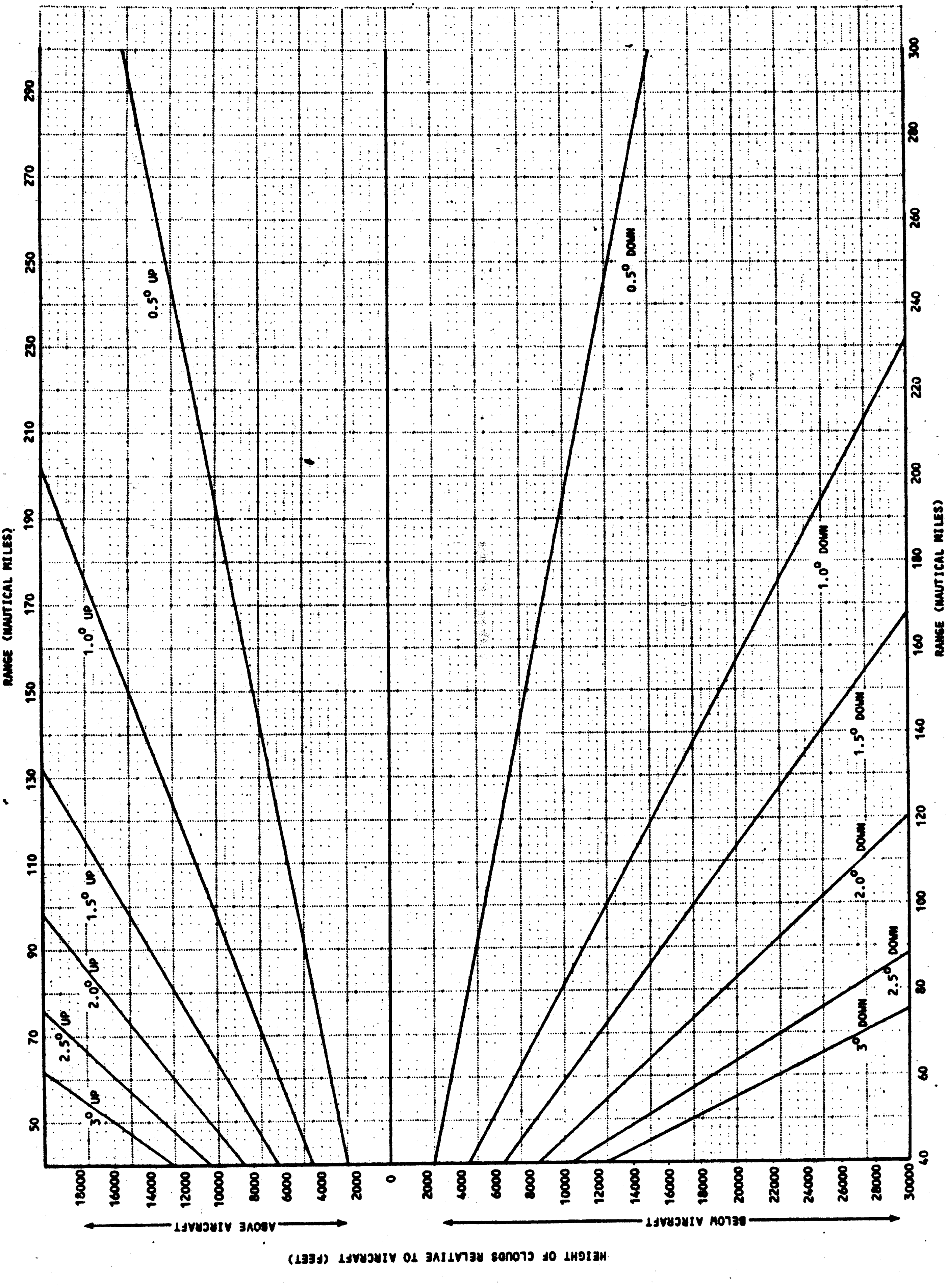
Continued......

FLIGHT IN SEVERE TURBULENCE

General Recommendations - All normal generalised recommendations regarding flight in, and avoidance of, potential areas of severe turbulence apply. In particular if overflight of a storm area is attempted it is important that it is properly established that adequate clearance will be present taking into account the possible growth rate of the storm. With the high speeds involved in supersonic flight once a decision to overfly has been made little opprotunity will be provided to modify this decision, in the form of attempting lateral avoidance, if the initial decision to overfly proves impossible at a later stage. Typically in the cruise at Mach 2.0 the latest time at which a 30° banked turn must be initiated in order to avoid a storm area of 15 nms radius directly ahead, is about 22 nms from the centre of the storm. Since this represents only about one minutes flying time from the storm centre, a more realistic range at which action requires to be taken to avoid a storm centre is perhaps twice this time or at a range of about; 40 nms. It should be noted that at this range (i.e. 40 nms) the radar beam represents a vertical depth of 10,000 ft.

Detection of severe storms should be possible at ranges in excess of 250 nms and a rough estimate of their height can be made by use of a range-height diagram whilst noting the angle of tilt at which the return is no longer received. This method can also be used to give some idea of the rate of growth of cloud. However, it is doubtful whether the relative heights of aircraft and cloud top can be known better than ± 2,000 ft at the time when an overflight/avoidance decision must be made, and this value must be added to any margin it is decided is required for overflight (e.g. typical vertical separation required over a severe storm, based on an estimate of its height by the method suggested, should be in the region of 5,000 ft).

FLIGHT IN SEVERE TURBULENCE
HEIGHT OF CLOUDS RELATIVE TO AIRCRAFT (FEET)



FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

ntroduction - 'Flight Envelope' is the name given to the low and high limits of speed in relation to height, within which the aircraft is normally operated. These limits are also related to aircraft weight where this is applicable. The Envelope is represented graphically on page Vol.II.01.01.08.

'Mach/CG Boundaries' is the term used to refer to the forward and aft CG limits, in relation to Mach number, within which the aircraft is operated. The forward limits are also related to aircraft weight. The Mach/CG Boundaries are represented graphically on page Vol.II.01.01.06.

The ASIs, Machmeters and CG position indicators show continuously the limits arising from both sets of requirements, except the Lowest Authorized Speed limit (V_{LA}), as aircraft weight, height, speed and CG position vary. A normal procedure is recommended for setting the ASI index to the V_{LA} appropriate for the condition of flight. Additionally there is a system of audio, visual and/or tactile warnings should any of the limits be exceeded. A graphical illustration of the limits arising from both sets of requirements is shown, for one given CG position, on the figure on page 08.28.10.

Flight outside the limits of the flight envelope and/or Mach CG boundaries is not normally permitted, but both are constructed so that inadvertent excursions due to upsets or extreme atmospheric effects leave adequate margins to permit safe recovery back within the authorized envelope or boundary.

Under certain laid down conditions, intentional flight outside the limits is permitted for airworthiness testing and for crew training. See Section 6 Flight Manual.

Flight at and beyond the high speed limits - The high speed IAS limit (V_{MO}) varies within a wide range from 300 kt at sea level to 530 kt at about FL 430 and reduces in the conventional way with height at constant Mach number, (M_{MO}) above about FL 510. From sea level to about FL 430, V_{MO} varies also with weight. In the supersonic cruise at temperatures greater than ISA + 5°C, speed must be reduced to remain within the temperature limit, (T_{MO}).

The max. speed pointers on the ASI and Machmeter indicate the lowest of the limits determined by V_{MO}, M_{MO}, or T_{MO}. The overspeed audio warning operates if V_{MO} is exceeded by 6 kt or T_{MO} is exceeded by 4°C. To provide advance warning of a possible overspeed the audio warning will also operate if the indicated pitch attitude is more nose down than -6°, whenever the aircraft is flying at speeds greater than M = 1.0. This warning is inhibited, however, if the stick shaker is operating

Within the flight envelope, the speed and Mach trim functions automatically apply up or down elevon, through the electric trim system, to provide, as far as is reasonably possible a conventional change of trim with change in speed. This counteracts the natural trim changes that occur due to the change in lift distribution over the wing, as the aircraft accelerates up to, or decelerates from, cruise speed. When at supersonic speeds greater than M = 1.15, if speed is allowed to exceed V_{MO} + 5 kt, a further automatic trim function isintroduced to prevent any further inadvertent increase of speed. The authority of this function increases with increasing Mach number.

FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

In the case of a gross overspeed outside the flight envelope, the outer elevons are automatically driven progressively to, and held at, the zero degree position, when the speed exceeds V_{MO} + 25 kt. This signal is transmitted through the electrical control channels and will therefore not be present in the mechanical signalling mode. As speed is reduced, the elevons take up their normal demanded position at V_{MO} + 20 kt. This 'neutralising' of the outer elevons prevents the lateral control reversal effect which could take place if a gross excess of speed is allowed to occur in the transonic region, and hence ensures adequate roll power is maintained.

In the supersonic cruise, when ambient temperatures are above ISA + 5°C, temperature becomes the overriding limit. Even large excursions above T_{MO} have no noticeable effect on handling characteristics or engine operating performance, however, they can have a long term effect on both airframe and engine life. Excursions above T_{MO}, must therefore be avoided and where inadvertent excursions occur, immediate action taken to reduce speed to ensure they are of only a transient nature. See page Vol.II.01.01.07.

Altitude Limit - The upper boundary of the flight envelope is 60,000 ft at all speeds. This is a more significant limit than the equivalent for conventional subsonic aircraft in that the very high kinetic energy and lift capability available at high supersonic speeds permits it to be very readily exceeded, by simple conversion of speed into height. Because of this a warning is provided when the height limit is exceeded by a significant margin, (See 'Flight at and below the low speed limits'). This height limit is not dictated primarily by handling considerations but by systems performance. Nevertheless, whenever exceeded, prompt recovery action should be taken to return to within the authorized envelope.

Flight at and below the low speed limits - The authorized low speed limits are conventionally derived at low speeds from the minimum permitted speeds during take-off and landing, (V_2 and V_{REF}). Once established en-route the minimum value (V_{LA}) is initially 250 kt increasing to 300 kt at 41,000 ft and above.

Exceedance of these limits at low levels is indicated by operation of the stick shaker whenever the incidence, (angle of attack) is permitted to go to, or beyond, 16.5°. It also operates when speed is allowed to fall below V_{LA}-20 kt, (i.e. 280 kt between 60,000 ft and 43,000 ft and 230 kt between 43,000 ft and 25,000 ft). In addition, at speeds below 380 kt the stick shaker will operate whenever 63,000 ft is exceeded. This provides warning of departure from the height limit of the authorized envelope. Recovery from stick shaker operation is achieved by increasing power and applying down elevon to increase speed and reduce incidence, (angle of attack), where appropriate, or in the case of the altitude limit being exceeded, to ensure height is lost.

The stick shaker is also operated when the aft CG boundary is exceeded by a significant margin indicating that speed is too slow for the prevailing condition (See Mach/CG boundaries).

FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

The primary anti-high incidence protection systems are operative only at speeds below 270 kt since they are fitted to provide protection in the low to medium altitude range where flight at slow forward speed is required. At high altitude the primary protection against inadvertent speed loss is the stick shaker and here very significant departure from the authorized flight envelope must occur before any limiting low speed condition is reached.

At very low speeds a deterioration in longitudinal stability occurs with increasing incidence, (angle of attack). On the same principle as the speed and Mach trim, the incidence, (angle of attack), trim is used to apply automatically up or down elevon, as appropriate, through the electric trim system, to counteract this deterioration. When flying at authorized speeds the system is required only to make very small inputs, but if speed is permitted to fall well below the normal minimum value the authority of the system is increased and it serves as a measure of protection against further inadvertent loss in speed.

Protection against a rapid increase in incidence, (angle of attack), or speed decay rate, is provided by use of the pitch autostabilization system. At an incidence, (angle of attack), greater than 13.5°, both the gain and authority of the system are increased in a down elevon direction, such as to oppose any elevon control commands or external disturbances, that would otherwise produce an undesirably rapid rate of approach to the absolute safe limit (19°) or incidence, (angle of attack). Should the limiting incidence, (angle of attack), be achieved, or approached rapidly, at a speed of 140 kt or less, the pitch autostabilization system applies an additional 4° down elevon demand (i.e. on operation of the stick wobbler - see below).

Identification of the limit incidence, (angle of attack), having been reached, (or a rapid rate of approach to it), is provided by the stick wobbler. This can be likened to a pulsating stick pusher, but it operates only towards the trimmed position and the effect on the stick ceases to be felt when backward pressure on the stick is released. The system can sense rate of increase of incidence, (angle of attack) but the stick shaker system cannot. Therefore, to prevent operation of the wobbler before the stick shaker, the shaker is always signalled to operate simultaneously with the wobbler should it not already be operating.

In the normal event, recovery action should be taken well before the limiting incidence, (angle of attack), is achieved. Should it be achieved, however, either deliberately (for training purposes), or inadvertently, prompt recovery action should be taken by simultaneously applying full throttle and down elevon. When the angle of attack reduces to about 12°, and the speed begins to increase, the aircraft should be eased out of the ensuing dive by increasing attitude gently to regain the required flight path.

FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

As incidence, (angle of attack), is increased to high values directional stability, as well as longitudinal stability, deteriorates. To compensate for this, the yaw autostabilization gain and authority are augmented at an incidence, (angle of attack), greater than 13.5°.

It should be noted that all high incidence, (angle of attack), protection devices operating through the autostabilization systems will not be operative on any surfaces in mechanical signalling.

Movement of the CG in flight - As previously mentioned, during the acceleration to cruise speeds there is a change in lift distribution on the wing. This change is similar to that found on conventional high speed subsonic aircraft and arises due to the formation and movement of shock waves on the wing at the higher Mach numbers.

Once full supersonic flow is established on any wing (i.e. supersonic as opposed to transionic flight) the shock waves take up a fixed formation which results in a lift distribution such that the centre of pressure is moved considerably further aft. During the acceleration from subsonic to supersonic speeds, therefore, although the changes in centre of pressure that occur are not necessarily continuously uniform in direction throughout the early part of the acceleration, they do eventually require a progressive need to apply more nose up control, so long as the CG remains in a constant position. This results in high drag due to a significantly deflected control surface in an already intrinsically high drag region, and it also limits manoeuvre capability in a nose up direction. In addition, the formation of shock waves reduces control effectiveness so that for a given condition more control surface deflection is required to trim than would be the case if shock waves were not present.

To compensate for the need for large control deflection angles with the attendant problems of high drag and limited manoeuvre capability, fuel is transferred aft (and hence the CG moves aft) as the aircraft accelerates. This maintains the CG in a position such as to match that of the centre of pressure so that in steady flight only small elevon angles are usually required to trim. The combination of the Mach and speed trim functions ensures that, in spite of the changes in trim due to movement of the shock waves on the wing and the CG shift, conventional stick forces with change in speed are sensibly maintained.

Since the CG position that is desirable for one condition of flight may well be unsuited to another condition, the permissible CG range is a variable, dependent on flight conditions. This has the effect of producing a unique authorized envelope for any given CG position, which lies within the overall flight envelope. A typical envelope for a CG position of 55.6% is given by the figure on page 08.28.10.

FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

In flight CG limits - As it is an increase in speed accompanied by the centre of pressure change that permits safe flight at a more aft CG, the aft boundary may be considered as a modification of the conventional low speed limit, and conversely, the forward boundary can be considered as a modification of the high speed limit. However, it should be noted that at the extremes of the authorized envelope it is possible to be flying at the maximum authorized speed on the aft limit. It is also possible to be flying at the minimum authorized speed on the forward limit.

The basic criteria that govern the limits for any condition are the maintenance of adequate longitudinal stability, the control travel limits and the power available at the elevon jacks. The latter two determine the degree of manoeuvrability available. It is a requisite, therefore, that within the authorized CG range none of these factors become limiting, and that an adequate margin is provided for inadvertent transgressions of the authorized boundaries. The ultimate limits themselves vary, dependent on a number of factors and these are:-

The speed and Mach number.

The weight of the aircraft.

The engine thrust.

The total temperature variations the aircraft has been subjected to on a particular flight.

Whether or not the pitch autostabilization is operative.

The worst possible combination of these factors has been taken into account and the boundaries established accordingly. In addition the rate of fuel transfer possible has been considered where this could affect recovery from a limiting situation.

The normal procedures are matched to the normal rate of acceleration and deceleration of the aircraft, together with the rate of fuel transfer rearwards and forwards, in such a way that speed and CG position are normally maintained within the boundaries throughout the flight profile. In conditions producing extremes of performance, however, it may be necessary to 'pause' temporarily with the fuel transfer or the rate of acceleration. Mismanagement of the fuel transfer, or a gross divergence from the normal flight profile for any reason, can naturally lead to transgression of the boundaries. Indications and warnings of such transgressions are provided, and are described overleaf.

The flight deck indication of limits for take-off, landing and supersonic cruise are set at a small margin beyond the operating limits. This is to allow for tolerances in the indication system where flight is planned at the limit. For these flight conditions pre-computation of fuel quantities to meet the operating limits are made and are then cross-checked with the CG indicator once the relevant fuel quantities have been adjusted.

FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

Flight at and beyond the aft limit - The aft limit is determined mainly by considerations of stability, except at low supersonic speeds, where half power to the elevons is the predominant consideration.

Good handling qualities are preserved out to the aft limit and although degraded when pitch autostabilization is lost, never reach an unacceptable level. In the very worst combination of conditions, including only half power to the elevons, it is possible at the aft limit, and at low supersonic speeds, to be unable to maintain the maximum authorized speed. Should this very unlikely combination of circumstances occur it is only necessary to reduce speed, as the procedures dictate, to 350 kt and descend until the aircraft is subsonic. Once speed has been reduced complete control will immediately be re-established. The situation arises because the elevon jacks become saturated and it is not possible to apply sufficient down elevon to maintain the higher speeds.

Saturation of an inner elevon or elevons will be indicated by the INNER ELEV warning light and the relevant procedure is the same as that for flight on half elevon power. The inner elevons are the most powerful surfaces, in the aerodynamic sense, where control effectiveness is at its worst, so it is important that their failure to follow control demands fully is known. For this reason the inner elevon warning system also brings up the warning light should a spool valve linkage fail and hence control be lost to that elevon. The likelihood of such a failure is extremely remote, but the significance of such loss at supersonic speeds is sufficient to warrant the need for a warning. Whenever the warning appears at speeds between M = 0.93 and M = 1.70 the autopilot should be disconnected, speed reduced to at least 350 kt and a bank angle of 20° not exceeded. Maintenance of the speed and bank angle limits will ensure adequate control is available for return to subsonic speed.

If the aft boundary is exceeded the Mach/CG warning will operate and the degree of exceedance will be indicated on the Machmeter and CG indicator. Should remedial action be delayed, or insufficient, the second boundary will be reached, indicated by flashing of the Mach/CG warning lights and operation of the stick shaker.

When, however, forward movement of the CG is the overriding requirement, (i.e. in the case of a Mach/CG warning in low speed flight near the ground, or in high speed flight in the cruise), the aft limit second boundary warning is inhibited at Mach numbers less then M = 0.45 or more than M = 1.6. This avoids the consequences of an instinctive reaction to the stick shaker which is an inappropriate action to effect a recovery in these conditions. If the secondary boundary warning commences above M = 0.45, it is not inhibited if the speed is subsequently reduced to below M = 0.45 and the aircraft is still outside the second boundary. This is to ensure that loss of the second boundary warning is not mistaken for successful remedial action when the aircraft is in fact still well outside the authorized boundaries.

FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

It is possible to have an aft CG warning at high speed. Therefore, to avoid simultaneous operation of the stick shaker and overspeed warning, the second level of warning is inhibited if the speed is equal to or greater than V_{MO} -7kt.

Flight at and beyond the forward limit - The forward limit is determined mainly by manoeuvrability considerations. Therefore, as the aircraft accelerates from subsonic to supersonic speeds it is the rearward movement of the centre of pressure that principally determines the forward limit, coupled with need to assume the possibility of having only half elevon power available.

Manoeuvrability is considerably reduced when flying at transonic or supersonic speeds if the conditions of being on the forward CG limit and having only half elevon power are combined. In this condition if large pitch elevon demands are made, or are required roll control may be limited to that provided by the rudder. The roll control/rudder interconnect will automatically apply rudder when roll demands are made, and this can naturally be augmented if desired by pilot applied rudder inputs. Adequate, although limited, manoeuvre capability is available for safe flight within the authorized envelope, but to guard against the possibility of an inadvertent departure from that envelope the procedures require that the aircraft speed is reduced to 350 kt and then a descent carried out until the aircraft is subsonic. Once at subsonic cruise speeds full manoeuvre capability is restored.

If the forward boundary is exceeded the Mach/CG warning will operate and the degree of exceedance indicated on the Machmeter and CG indicator. Should remedial action be delayed, or insufficient, the second boundary will be reached, indicated by flashing of the Mach/CG warning lights.

Actions following warnings - The actions required following warnings are generally instinctive because the required action is seen easily be reference to the indices on the Machmeters or the CG position indicators.

If a first stage warning occurs, correct fuel transfer should be confirmed. This situation may also be corrected by increasing, decreasing or maintaining the Mach number as appropriate.

If a second stage warning occurs because of misdirection or gross mismanagement of fuel transfer, corrective action to both Mach number and CG position is required. It may be necessary to reverse the acceleration or deceleration and to reverse the direction of transfer. The appropriate actions are detailed on the figure on page 08.28.10.

In the presentation of the combined flight envelope and Mach/CG boundaries, there are 'corners' where conflicting requirements of increase/decrease speed warnings can arise following non standard management of either fuel transfer or flight profile. The appropriate actions are detailed on the figure on page 08.28.10.

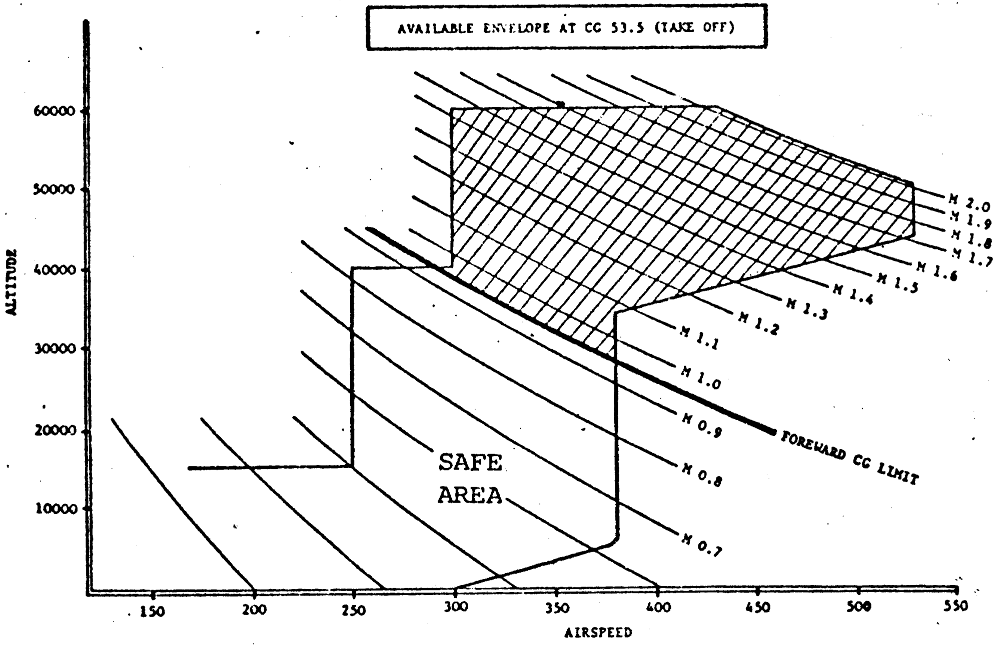
FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

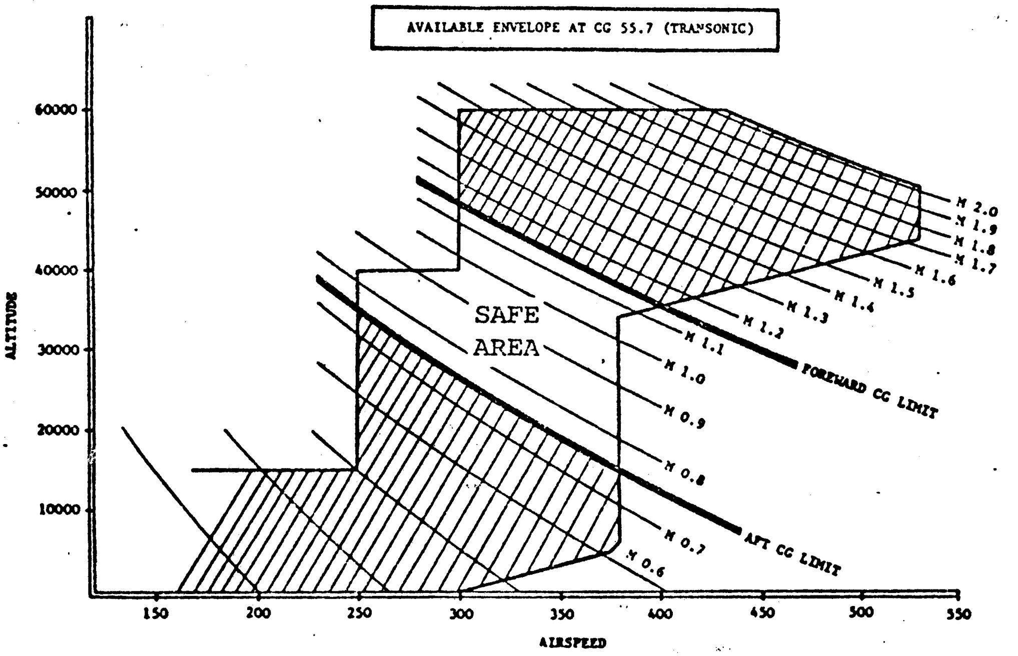
Loss of an Inner Elevon - The inner elevons are the most powerful control surfaces, in the aerodynamic sense, under those conditions where control effectiveness is at its worst. The likelihood of such a failure is extremely remote but the significance of such loss in the transonic region requires that prompt action should be taken to reduce speed and bank angle, should it occur.

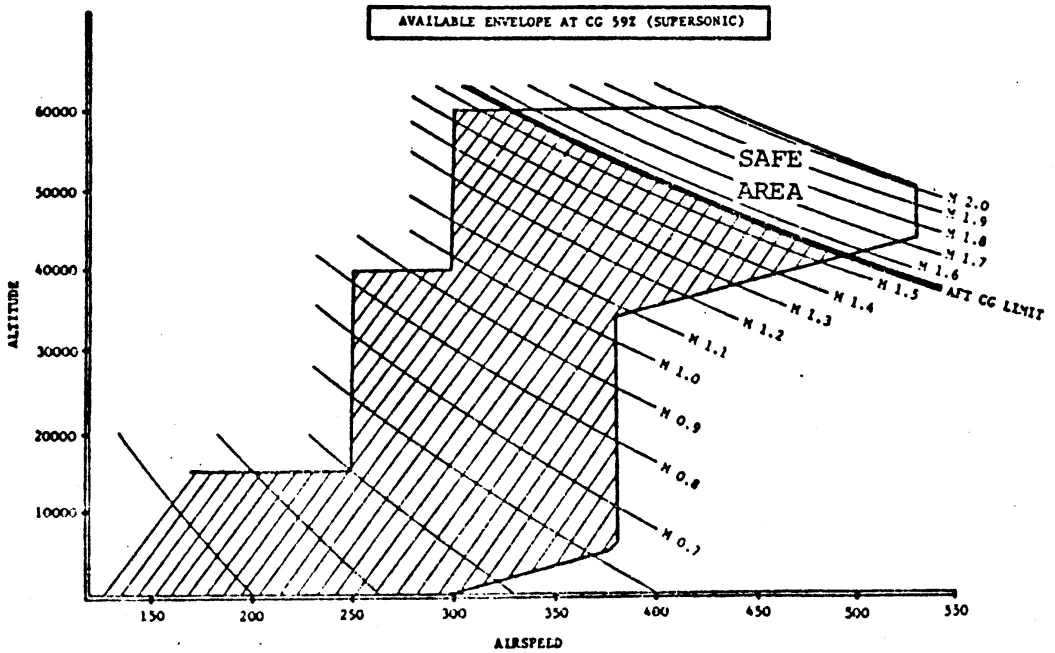
The failure can be brought about by failure of the spool valve linkage in the main servo control and will be indicated by the INNER ELEV. warning light. The failed control surface will tend to drift to the zero aerodynamic load condition and will not respond to pilot control inputs. Since the other inner elevon will respond, then unique demands in either pitch or roll will result in a combined pitch and roll response from the aircraft. This requires that slow small control movements are made where possible so that the effect is kept to a minimum. At speeds between 0.93M and 1.7M speed must be reduced to at least 350Kts. and bank angle limited to 20° to ensure that an adequate margin of control is maintained. At other speeds ample control is available but the autopilot must not be engaged at any time with this failure present.

The INNER ELEV. warning light will also indicate saturation of the elevon jacks, that is, when there is insufficient hydraulic power to move the control surface to the demanded position. This should only occur when flying on half elevon power and will be distinguishable from spool valve linkage failure by the fact the condition should only be transitory and both inner elevons will fail to respond throughout the period the warning light is on. The probability of such saturation of the inner elevon control jacks is remote, but should it occur no action is necessary other than to ensure appropriate limitations are being observed.

FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

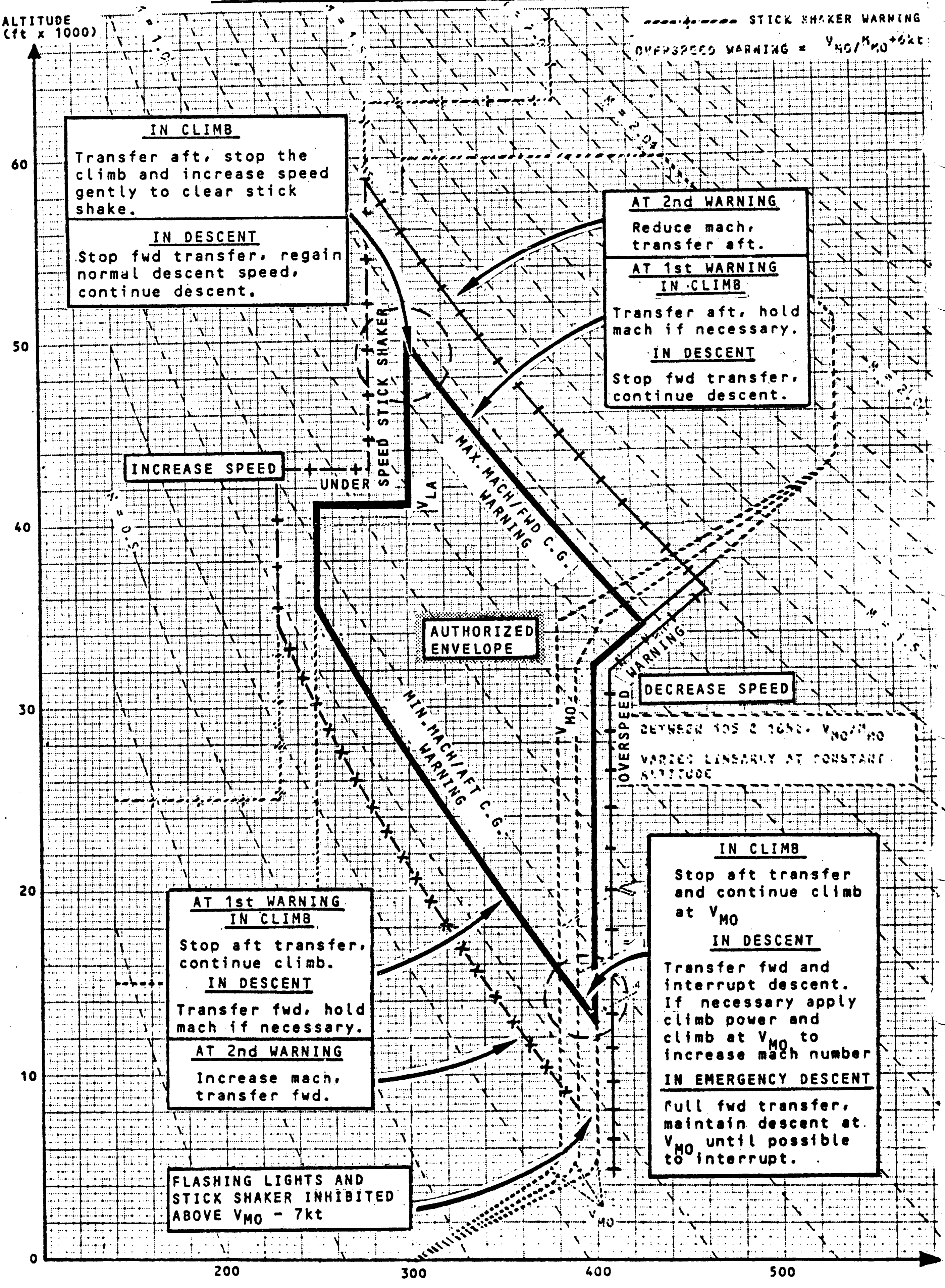






FLIGHT ENVELOPE AND MACH/CG BOUNDARIES

CORRECTIVE ACTIONS FOLLOWING WARNING OF DEPARTURE FROM AUTHORISED ENVELOPE



IN CLIMB

Transfer aft, stop the climb and increase speed gently to clear stick shake.

IN DESCENT

Stop fwd transfer, regain normal descent speed, continue descent.

AT 2nd WARNING

Reduce mach, transfer aft.

AT 1st WARNING
IN CLIMB

Transfer aft, hold mach if necessary.

IN DESCENT

Stop fwd transfer, continue descent.

BETWEEN 32 & 36kft. V_{MO}/M_{MO} VARIES LINEARLY AT CONSTANT ALTITUDE

AT 1st WARNING
IN CLIMB

Stop aft transfer, continue climb.

IN DESCENT

Transfer fwd, hold mach if necessary.

AT 2nd WARNING

Increase mach, transfer fwd.

IN CLIMB

Stop aft transfer and continue climb at V_{MO}

IN DESCENT

Transfer fwd and interrupt descent. If necessary apply climb power and climb at V_{MO} to increase mach number

IN EMERGENCY DESCENT

Full fwd transfer, maintain descent at V_{MO} until possible to interrupt.

FLASHING LIGHTS AND STICK SHAKER INHIBITED ABOVE V_{MO} - 7kt

(Compl ly Revise

AUTOTHROTTLE

The autothrottle provides thrust control of speed. Normally both systems are engaged with number 1 system in control and number 2 system in synchronised standby. Autothrottles may be used for three engine or four engine flight, and must be used when the autopilots or flight directors are used in an approach mode.

Engagement - The autothrottle is engaged by selecting the switches on the autothrottle controller. Successful engagement in either the basic or prime modes is indicated by the solenoid-held switches remaining in the engaged position.

If the autopilot is not engaged, or is engaged in a compatible mode, the autothrottle will engage in its basic mode of IAS HOLD.

If the autopilot is engaged in the ALT ACQ prime mode the autothrottle switches will hold on but no lights will come on. This indicates that the autothrottles are primed and will hold the airspeed at which the autopilot starts to acquire a new altitude.

As the autopilot captures its new altitude the autothrottle IAS HOLD light will come on and the throttle levers move, to hold the speed at capture.

If the autopilot is engaged in a speed mode, engagement of the autothrottle will cause the autopilot to revert to PITCH HOLD unless the ALT ACQ is also primed.

Climb - Autothrottle is not normally used during the climb unless it is intended to carry out a subsonic cruise. In this case as soon as the autopilot or flight director is in the ALT ACQ prime mode, the autothrottle switches can be engaged.

If the autothrottle is not engaged when the autopilot or flight director starts to capture the selected altitude, the red AT lights on the warning and landing displays will flash.

Subsonic Cruise - Level subsonic segments of flight are usually carried out with the autothrottle engaged. If the autothrottle is engaged in its basic mode of IAS HOLD, the autothrottle datum adjust on the pedestal can be used to alter airspeed by up to 22 kts.

If the autothrottle is in the MACH HOLD mode, the autothrottle datum adjust can alter the datum by ± 0.06 M.

If a greater change of speed is required, the desired figure can be set on the autothrottle SPEED SELECT and the IAS ACQ light pressed.

NOTE: When the IAS ACQ light is pressed, the bar which partially obscures the numbers in the speed select window is removed. The IAS ACQ mode once engaged will remain engaged until another mode selection is made or the autothrottle is disengaged. The speed range available on SPEED SELECT is 130 to 400 kts.

Level Supersonic Cruise - On passing through M = 2.00 engage the autothrottle in MACH HOLD.

Supersonic Cruise Climb - On achieving M = 1.7 prime the autothrottle associated with the autopilot in use. At the corner point between 530 kts and M = 2.00 or T_{MO}, the autothrottle will engage in MACH HOLD. See AUTOPILOT for AP/AT combination in supersonic cruise climb.

AUTOTHROTTLE

Deceleration and Descent - Throttles are manually controlled during the descent until below M = 1.00 when they are fully closed.
When cleared to a subsonic flight level this level should be set on the ALTITUDE SELECT, the autopilot or flight director selected to the ALT ACQ mode and the autothrottle switches engaged.

When the selected altitude is captured the autothrottle will engage in the IAS HOLD mode and maintain the IAS at capture.

Approach - The normal four and three engine approach on Concorde is with both autothrottles engaged, if for some reason autothrottle is not available special care must be taken.
Final approach is carried out with AT in IAS ACQ and desired speed set in the IAS ACQ window.

NOTE: When a new speed is selected in IAS ACQ mode and a discrepency of approx 10 kts or more exists between the selected speed and the actual speed, the amber light on the ASIs will be on.

Final Approach - Speed should be reduced to the target speed in one step, particularly in the event of an intended autoland. If this is not possible the speed should be reduced from intermediate approach speed, e.g. 190 knots, to the target speed in not more than two steps aiming to achieve the target speed at, but not lower than, 700 feet.

On a manual approach the autothrottles must be disengaged at 40 feet, the power at disengagement being maintained until 15 feet.

NOTES: The above procedure is necessary because if, during the final approach, the speed is reduced in small steps at short intervals, such that the difference between the selected speed and the actual speed remains less than 12 knots, a cumulative error can be built up which will cause the achieved final approach speed to be lower than that selected. The magnitude of this error will depend on the number of steps and the interval between them, but could be up to 12 knots.

Autothrottles must not be used:

(a) In the IAS HOLD mode below 185 kts.

OR

(b) With 2 engines inoperative.

Automatic Landing - Speed on the approach is controlled in IAS ACQ using the SPEED SELECT control.

At 15 feet radio altitude the throttle levers will close at the rate of 4° per second to the minimum autothrottle limit.

At mainwheel contact disconnect the autothrottles using an instinctive disconnect button on the outboard throttles and fully close the throttles.

Apply reverse thrust in the normal manner.

Reduced Noise Approach - On reducing to 190 kts engage AT in IAS HOLD.
Preset V_{TT} in IAS ACQ window and upon reaching 800 ft R.A. engage AT in IAS ACQ.

AUTOTHROTTLE

Disengagement - When autothrottle is no longer required, it is cancelled by using an instinctive disconnect button. Whenever the autothrottle is disengaged the AT red lights on the warning and landing displays will start to flash. These flashing lights can be cancelled by operating an autothrottle disconnect button again.

Individual autothrottles can be disengaged by the switches on the overhead panel.

The slip clutches in the autothrottle mechanism allow direct manual override.

Destabilising Effect of Autothrottle - Autothrottle is of considerable benefit when hand flying particularly at lower speeds, provided that attitude changes are kept small. It should be remembered however, that there is a "destabilising effect" which becomes more apparent with large attitude changes.

Without autothrottle, the aircraft has a normal tendency to return to its original speed following a disturbance or change in attitude.

With autothrottle, speed is maintained following a disturbance or change in attitude, but the power change which achieves this, produces a change in trim which tends to sustain the divergence.

This effect increases the need to monitor attitude carefully in order to prevent divergence from the desired flight path. This need is particularly noticeable in the approach phase and is also noticeable in turns.

(Deletion)

AUTOPILOT

The aircraft installation consists of two autopilots, which can operate from 500 ft on climb out, throughout the flight to decision height on approach or to a fully automatic landing. Normally the autopilot appropriate to the handling pilot would be used and only in LAND mode can both autopilots be engaged.

Engagement - Above 500 ft in the climb or 1000 ft in cruise the appropriate AP switch may be engaged. Successful engagement is indicated by the switch remaining engaged with its associate AP light (green) on.

Successful engagement requires:-

1. Turn control in detent.
2. An electric trim.
3. Associated relay jack serviceable and hydraulic system pressurised.
4. Associated INS serviceable.
5. Associated compass coupler serviceable.
6. Associated ADC serviceable.
7. All three axes of the associated autostabilisation system serviceable.
8. No excess incidence or pitch attitude warnings.

On engagement the autopilot will be in its basic modes of PITCH HOLD and HDG HOLD.

If the aircraft is manoeuvring at engagement, the autopilot will level the wings and regain the heading at engagement while maintaining pitch attitude. In the basic modes, turns up to 35° of bank are accomplished using the AUTOPILOT TURN knob, and pitch attitude changed by using the autopilot datum adjust.

NOTES:
1. Operation of the AP TURN knob will cause the autopilot to revert to basic modes from any modes except LAND and GO AROUND.
2. BACK BEAM is only a flight director mode, the autopilot will not engage in this mode.

Navigation - After engagement navigation can be achieved by:-

1. In HDG HOLD using the TURN knob.

OR

2. Selecting the desired heading or track, using the HDG PULL/TRK PUSH selector appropriate to the engaged autopilot and pressing TRK HDG. Subsequent movement of the HDG PULL/TRK PUSH selectors with this mode engaged, will cause the aircraft to turn onto the selected heading or track.

OR

3. Pressing INS, the autopilot will acquire and hold the track between the waypoints set in the associated INS.

OR

AUTOPILOT

4. Pressing VOR LOC. The autopilot will, if on a suitable heading, acquire and hold the VOR radial or localizer set on the associated nav. radio and VOR/LOC REF selector. During acquisition the triangular prime light only will be on. Successful capture of the radial is indicated by the VOR LOC light illuminating and the prime light going out.

Climb - After engagement the vertical flight profile can be achieved by:-

1. In PITCH HOLD using the autopilot datum adjust knob to control pitch attitude.

OR

2. Pressing IAS HOLD. The IAS at engagement will be held but a change of ± 20 kts is available using the AUTOPILOT DATUM ADJUST.

OR

3. Pressing MACH HOLD. The mach number at engagement will be held but a change of ± 0.06 M is available using the AUTOPILOT DATUM ADJUST.

OR

4. Pressing VERT SPEED. The vertical speed on engagement will be held, as displayed by the white command bug and index on the associated VSI. The autopilot datum adjust will alter the demanded vertical speed to a maximum of 6,000 ft/min climb or descent, and display the demand on the VSI.

OR

5. Pressing MAX CLIMB when at or near V_{MO}. Speed will be controlled to V_{MO}. The datum can be varied by ± 17.3 Kts, using the autopilot datum adjust. It may take up to six minutes for the aircraft to settle at the new datum. MAX CRUISE will engage and MAX CLIMB disengage at the flight envelope "corner point" between 530 knots and M = 2.00 or T_{MO}.

NOTE

At the automatic disengagement of MAX CLIMB any datum shift inserted while in that mode will be zeroed.

OR

6. Pressing ALT HOLD, holds the altitude at engagement. This altitude may be adjusted ± 600 ft using the autopilot datum adjust.

OR

Continued......

AUTOPILOT

7. Pressing ALT ACQ initiates the acquisition of the altitude set on the ALTITUDE SELECT. The ALT ACQ prime light will indicate that this mode is primed and the autopilot will remain under the control of the previous mode (except ALT HOLD). As the aircraft approaches the selected altitude the ALT ACQ light will come on and the prime light and previous mode lights go off. At the selected altitude the ALT ACQ light will go off and the ALT HOLD light will come on.

   NOTE: If during an autopilot or flight director ALT ACQ manoeuvre the autothrottle is not engaged at the time of capture initiation, then the red AT light will flash on both warning and landing displays.

OR

8. Pressing TURB. The turbulence mode should only be used in very severe turbulence conditions when the use of PITCH HOLD results in autopilot disconnects. It will hold existing pitch attitude and heading and reduce the trim rate of the electric trim system.

Subsonic Cruise - Navigation can be achieved as previously described.

Level subsonic cruise will normally be carried out in ALT HOLD with the speed controlled by the autothrottles in MACH HOLD or IAS mode as appropriate.

Climb or descent to a different subsonic level can be accomplished by:-

Selecting the new cleared altitude on the ALTITUDE SELECT and pushing the ALT ACQ light; the ALT ACQ prime light and the

VERT SPEED light will come on and the ALT HOLD will go off. The aircraft will start to change height towards the selected level at 800 FPM. The vertical speed can be changed using the autopilot datum adjust and the command bug on the associated VSI shows the selected vertical speed. The aircraft will capture and stabilise at the selected level in ALT HOLD mode.

Transition from Subsonic Cruise to Supersonic Flight - When clearance is obtained for climb and acceleration:

1. Set the ALTITUDE SELECT to the cleared level or 60,000 ft.
2. Press PITCH HOLD.
3. If within 15 kts of V_{MO} increase pitch attitude by 3°.
4. Disengage autothrottles and select climb power.
5. Climb at V_{MO}.
6. At 0.93 M increase pitch attitude a further 2° and select reheats on, two at a time.
7. Use autopilot datum adjust to achieve V_{MO}.
8. At V_{MO} engage autopilot in MAX CLIMB mode.
9. At M = 1.70 prime the associated autothrottle.
   At M = 1.70 or after 15 minutes operation cancel reheat.

Uninterrupted Climb - The ideal Concorde climb is at V_{MO} until the cruise climb is started at M = 2.00 or T_{MO}.

As soon as the restrictions of ATC and noise abatement allow, apply climb power and fly the aircraft to V_{MO} using the PITCH HOLD mode. In level flight it is necessary to anticipate arrival at V_{MO} by about 15 kts and to pitch the aircraft up to about 10°, using the datum adjust. Stabilise the speed close to V_{MO} and engage the MAX CLIMB mode, At M=1.70 prime the associated autothrottle.

CAUTION

IN MAX CLIMB AND MAX CRUISE MODES COMBINED USE OF AUTOPILOT 1 WITH AUTOTHROTTLE 2 OR AUTOPILOT 2 WITH AUTOTHROTTLE 1 IS PROHIBITED BECAUSE SMALL DIFFERENCES BETWEEN THE OUTPUTS FROM ADC 1 AND ADC 2 MAY JEOPARDIZE THE PROPER SIMULTANEOUS FUNCTIONING OF THE AUTOPILOT AND AUTOTHROTTLE.

Reheat is selected, two at a time, at M = 0.93 and is used to M = 1.70 or for 15 minutes. The MAX CLIMB mode of the autopilot should cope satisfactorily with the thrust changes involved.

Supersonic Cruise Climb - Providing the autopilot is engaged in MAX CLIMB mode the autopilot will, at the "corner point" between 530 kts and M = 2.00 or T_{MO}, automatically engage in MAX CRUISE. This engagement will be observed at or before 50,200 feet. At the same time the autothrottle will engage in MACH HOLD. The autopilot/autothrottle combination is programmed to increase Mach number to 2.02 and return to 2.00. The autothrottle MACH HOLD light will not go off until the throttles are again fully open and the Mach number has reduced to 2.01 or 100 seconds have elapsed.

When the limiting cruise climb condition is T_{MO}, the climb phase immediately following the corner point will be achieved at a speed for which TMO may be exceeded by a few degrees. This exceedance will only be observed at high ambient temperature and low weight and will be of short duration. The exceedance should be tolerated provided the high speed warning is not activated.

NOTES:

As soon as MAX CRUISE engages the datum adjust facility is inhibited and if the datum has been shifted during the MAX CLIMB segment, the shift is automatically zeroed when MAX CRUISE engages.

Also at engagement of MAX CRUISE the flight director not assoicated with the Autopilot in control no longer displays pitch information.

A sustained turn or increasing ambient temperature during the cruise will cause the Mach Number to fall. In attempting to regain the cruise condition the aircraft will descend. The rate of descent will be in proportion to the initial reduction in Mach Number.

Throughout the cruise climb if an overspeed starts to develop, the primed autothrottle will become active and the MACH HOLD light will come on.

If an autothrottle is inadvertently left primed at the end of the cruise, retarding the throttles will cause the primed autothrottle to intervene and take the throttles back to the fully forward position.

NOTES

1. If the autopilot is selected to MAX CLIMB at altitudes above 50,200 feet the autothrottle/autopilot will perform the normal MAX CRUISE engagement cycle.
2. If the autopilot is disconnected when in MAX CRUISE, either inadvertently or deliberately, the autothrottle will automatically engage in MACH HOLD mode.
3. If the autopilot MACH HOLD or IAS HOLD modes are selected when in MAX CRUISE mode the autothrottle will automatically disconnect.
4. If the autopilot PITCH HOLD, ALT HOLD, VERT SPEED or ALT ACQ modes are selected when in MAX CRUISE mode the autothrottle will automatically engage in MACH HOLD mode.

Supersonic Cruise Climb without Autothrottle

Capture - When approaching the "corner point" between 530 kts and M = 2.00 or T_{MO} with the autopilot engaged in MAX CLIMB, observe the average rate of climb.

IF....the average rate of climb exceeds 500 ft/min wait until the MAX CRUISE mode light comes on. Then retard the throttles to decrease N_2 by 1% per 250 ft/min in excess of 500 ft/min. Continue to adjust N_2 until an average rate of climb of 500 ft/min at a speed not exceeding M = 2.00 is established. Then apply full power.

IF....the average rate of climb is 500 ft/min or less leave the throttles at full power and observe the MAX CRUISE light comes on.

(Completely Revised)

Cruise - With the MAX CRUISE light on and the throttles fully forward continue to monitor the rate of climb and speed.

Sudden temperature or wind shears may lead to an increase in Mach Number accompanied by a pitch up. In these conditions it is prudent to control the likely overspeed by reducing N_2 by 1% per .01M in excess of M = 2.00. As the Mach Number reduces to M = 2.00 re-apply full power.

Overspeed - If the overspeed warning is activated, retard the throttles to 18° or 24°. When the warning ceases slowly increase power in order to achieve full throttle at M = 2.00.

NOTE

In the case of an abnormally large overspeed, i.e. M = 2.10 or if the overspeed is sustained with the throttles retarded to 18° or 24°, the throttles may be retarded to flight idle.

Optimum Stepped Cruise Procedure - This procedure minimises fuel penalties and should be used whenever possible if stepped cruise is essential.

On passing through M = 2.00.

1. Engage autothrottle in 'MACH HOLD'.
2. Select 'VERTICAL SPEED' hold.
3. Prime 'ALTITUDE ACQUIRE' for 1500 ft below estimated aircraft ceiling.
4. When the aircraft is established in altitude hold, check the aircraft's height relative to its ceiling from the actual ambient temperature. If the aircraft is outside the range of 1200 to 1800 ft below its ceiling, adjust as necessary using the altitude acquire mode.
5. Cruise in ALTITUDE HOLD and autothrottle.

NOTE

From estimation or observation on the climb, it may be obvious that in warm conditions the aircraft initial cruise altitude will be reached at a Mach No. less than M = 2.00. In this case prime ALTITUDE ACQUIRE for the estimated ceiling and when the ALTITUDE ACQUIRE light illuminates, engage the autothrottle in MACH HOLD. Check the altitude relative to the ceiling as before.

(Completely Revised)

This procedure may result in the aircraft holding a slightly lower Mach No. than desirable and the fuel penalty may be increased. For this and the general reason that fuel penalties for operating below ceiling are greater in hot conditions, cruise/climb should be used whenever possible.

6. Using ALTITUDE ACQUIRE increase cruise altitude by 1000 ft for every 8000 Kgs of fuel burnt, using the start of cruise fuel weight as datum.

NOTE

If cruising into increasing ambient temperature, it may not be possible to increase altitude as described. In these cases the procedure should be adjusted to maintain the aircraft 1200 to 1800 ft below its ceiling at the time when altitude changes are required.

Using this procedure, the aircraft is maintained well within the weight/altitude/temperature band, where the use of autothrottle in supersonic cruise is allowed by the Flight Manual.

Overspeed - In cruise with autothrottle, the number of high speed warnings is reduced. However, should there be a high speed warning which is not immediately corrected by the autothrottle, then carry out the procedure detailed previously.

Alternative Stepped Cruise Procedure - Air Traffic Control constraints in particular may demand cruise at constant altitude for long periods, with stepped altitude changes of at lease 4000 ft. The same procedures for climb and cruise acquisition as detailed above should be used as far as possible.

Cruise -

1. On acquiring assigned altitude, continue cruise in ALTITUDE HOLD and autothrottle in MACH HOLD.

2. On reaching the combination of weight/altitude/temperature, where autothrottle is not permitted, disconnect autothrottle and control the Mach No. by manual throttle using small movements of the throttles and allowing the Mach No. to vary in the range M = 1.98 to M = 2.02. Above 50,000 ft the approximate weight to meet these conditions is 125,000 kgs.

3. Use VERT SPEED and ALTITUDE ACQUIRE for stepped altitude changes with either autothrottle in MACH HOLD, if its use is permitted, or manual throttle.

NOTE

Fuel penalties can become significant especially in temperatures above ISA + 5°C.

The reason for the restriction of autothrottle in certain combinations of weight/altitude/temperature, is due to the ability of the autothrottle system, following an atmospheric disturbance, to close the throttles beyond the normal throttle closure limit (i.e. 18° or 24° throttle angle depending on ambient temperature). This could result in a 'pop' engine surge.

Supersonic Cruise below 47,000 ft - In the remote event of a radiation warning, it is necessary to cruise at 47,000 ft or below. It is important not to lose speed in the descent, otherwise it may be extremely difficult or even impossible to achieve V_{MO} at the desired flight level.

Procedure

1. Disengage autopilot.
2. Descend at M = 2.0 to 50,000 ft and then at V_{MO} until reaching cruising level. Rate of descent should be limited to 2,000 ft/min maximum.
3. Re-engage autopilot.
4. Select 'ALT HOLD' and autothrottle to maintain cruise at V_{MO}.

NOTE

If the cruising level is below 45,000 ft care must be exercised not to exceed V_{MO} in the descent passing through 44,000 ft where V_{MO} starts to decrease from 530 kt.

Deceleration and Descent - When cleared to a subsonic level:-

1. Set the ALTITUDE SELECT to the cleared level.
2. Engage ALT HOLD; the other autopilot pitch modes will disengage.
3. Retard throttles to initial descent power.
4. When speed has reduced to 350 kts engage the autopilot IAS HOLD mode.

NOTE

Speed initially falls off slowly but at an increasing rate. Since V_{LA} at cruise altitudes is 300 kts attention must be paid to speed during this manoeuvre.

5. Press ALT ACQ and note that the prime light comes on.

6. Set both autothrottle switches to engage.

NOTE

Engagement of autothrottles, when ALT ACQ is selected, will only arm the autothrottles. The autothrottle will automatically engage in IAS HOLD at the altitude capture point.

7. Throttles are adjusted manually during the descent.

Acquisition of the selected height is indicated by the following.

1. The ALT ACQ light on, and the ALT ACQ prime light and autopilot IAS HOLD light off.

2. The autothrottle IAS HOLD light comes on and the throttles open to maintain speed.

3. At the selected altitude the ALT HOLD caption comes on and ALT ACQ goes off.

NOTE

If a prolonged subsonic cruise is necessary speed should be adjusted to the required cruise speed using the autothrottle IAS ACQ and MACH HOLD modes.

Subsonic Stepped Descent - On re-clearance to a lower altitude:-

1. Set the cleared altitude on the ALTITUDE SELECT.

2. Press the ALT ACQ light. The ALT HOLD light goes off and the ALT ACQ prime light and VERT SPEED light come on.

NOTE

Vert speed is automatically engaged upon selection of ALT ACQ from ALT HOLD. The aircraft will start to change altitude at a rate of 800 fpm.

3. Set the required rate of descent on the appropriate VSI command bug using the autopilot datum adjust.

4. When approaching the selected altitude, the ALT ACQ light will come on and the ALT ACQ prime light and VERT SPEED light will go off.

5. At the selected altitude the ALT HOLD will engage and the ALT ACQ disengage.

6. The autothrottles will maintain the selected speed throughout the manoeuvre.

If re-clearance to a lower altitude occurs while the ALT ACQ light is on and before ALT HOLD engages:-

1. Set the ALTITUDE SELECT to the new cleared altitude.

NOTE

Resetting the altitude select during a capture phase will engage the PITCH HOLD mode.

2. Press VERT SPEED light and adjust the vertical speed to a desired value using the autopilot datum adjust.

3. Altitude capture will occur as previously described.

Initial Approach -

1. The most convenient mode to use when following radar vectors or carrying out a procedural let down is TRK HDG. The aircraft heading being adjusted on the HDG PULL/TRK PUSH selector.

   However, if desired HDG HOLD and the autopilot TURN knob could be used.
2. Speed is controlled with the autothrottle in the IAS ACQ mode and using the SPEED SELECT control, except for Reduced Noise Approach when AT in IAS HOLD is employed.
3. Altitude is maintained in ALT HOLD and changed as previously described in stepped descent.

ILS Approach

1. On VHF NAV control units set required frequencies. Verify identifications and set localiser headings using the VOR LOC REF controls.

2. Using TRK HDG mode select a heading to give an intercept angle that satisfies the capture envelope.

3. Press VOR LOC light and observe the prime light comes on. At localiser capture the VOR LOC light will come on, the prime light and the TRK HDG lights will go off.

4. When established on the localiser, engage GLIDE mode and observe the prime light comes on.

(Unchanged)

5. At glide slope capture the GLIDE light will come on, the glide prime light go off and ALT HOLD disengage.

NOTE

If the GLIDE light is pressed before LOC VOR, both LOC VOR and GLIDE modes will be primed.

If the LAND light is pressed, the LOC VOR and GLIDE and LAND modes will be primed.

6. Speed is controlled throughout the approach by the autothrottle in the IAS ACQ mode using the SPEED SELECT control, except for Reduced Noise Approaches when AT in IAS HOLD is used down to 800 ft R.A., at which stage AT IAS ACQ is engaged.

When established on the localiser (but not on Reduced Noise Approach), LAND may be pressed instead of GLIDE. In this case LAND prime and GLIDE prime lights come on. On glide slope capture the LAND light comes on and VOR LOC & GLIDE lights go off. LAND mode progressively reduces bank angle limits and beam sensitivity during descent on the glide slope.

Go-Around - If an overshoot is required after GLIDE or LAND lights are on:-

1. Disconnect the autothrottles using an instinctive disconnect button on the outboard throttles.

2. Push the throttles fully forward. This will engage the autopilot in the GO AROUND mode. The aircraft will pitch up to 15° and level the wings.

3. At 1,000 ft select HDG HOLD then PITCH HOLD. This will take the autopilot out of the GO-AROUND mode and put it into the basic modes of PITCH HOLD and HDG HOLD.

4. Re-engage other autopilot modes as desired.

5. When required speed and altitude attained, engage both autothrottles.

Autoland -

1. If land 3 capability is required, the SSB and Battery selectors must be set to SPLIT and ESS MAIN SPLIT respectively.

The LAND 2 and LAND 3 lights are armed. The ILS excess deviation lights are armed once the associated flags are cleared.

(Unchanged)

2. Position the aircraft onto the localiser as described in ILS approach.

3. When the localiser is captured the VOR LOC light will come on, LAND prime and GLIDE prime lights will remain on.

   Reduce the autothrottle selected speed to V_{REF} + 30 kt or 190 knots, whichever is the greater.

4. Carry out the AP changeover check.

5. At glide slope capture, the GLIDE prime light will go off, the GLIDE light will come on and the previous pitch mode will disengage. At one dot glide deviation reduce the autothrottles selected speed to target approach speed.

NOTE

The autopilot can capture a glide slope from above or below providing the vertical speed is between minus 2000 and plus 500 ft per min.

6. At glide slope capture, providing that the aircraft has been on the localiser for 15 seconds, LAND will come on and the land prime and GLIDE light will go off.

NOTE

At this stage in the automatic approach the AFCS panel status will be as follows:-

Autothrottles engaged in IAS ACQ mode
LAND light on
Both autopilots engaged
At lease one flight director engaged.

7. At glide slope capture the flare law in both autopilots is automatically checked.

8. If at 700 ft LAND light is not on, revert to GLIDE mode and continue approach.

9. At 300 ft confirm the capability is LAND 2 or LAND 3.

NOTE

Below 300 ft the capability indications are latched on except in the event of loss of both autopilots.

10. The flare height is dependant on rate of descent but will be at about 50 feet.

(Delet

11. At 30 feet automatic decrab commences.

12. At 15 feet the autothrottles will start to close at 4° per second.

13. At mainwheel contact; disconnect the autopilots and autothrottles, close the throttles fully and apply reverse in the normal manner.

Disengagement - Autopilots may be disengaged by using the AP DISC push buttons on the control columns or by using the AP1/AP2 switches on the AFCS controller.

Disengagement of the autopilot is accompanied by an audio (cavalry charge) and the AP light on both warning and landing displays. These warnings can be cancelled by pressing the control column button again.

(Deletion)

FLIGHT DIRECTOR

The two flight directors use the same input signals as the corresponding autopilots, and can be used regardless of the engagement state of the autopilots.

Engagement - Above 500 ft in the climb or 1,000 ft in cruise, either or both flight directors may be engaged. Successful engagement is indicated by the switch remaining on.

If a flight director is engaged prior to autopilot engagement, the flight director will engage in its basic mode of PITCH HOLD, and only the pitch command bar will show on the appropriate ADI.

If a flight director is engaged when an autopilot is already engaged, the flight director will assume the existing modes.

If an autopilot is engaged after the flight director, the autopilot basic modes will engage and the flight director command bars will be removed. However, if the flight director is in LAND mode the autopilot will also engage in LAND mode.

Navigation - Selection of any navigational mode will bring the roll command bar into view. By following these commands normal navigation can be achieved. The flight director also has a BACK BEAM facility which is not available to the autopilot.

Climb Cruise & Descent - The flight director can be used to follow the vertical profile in exactly the same way as described under Autopilot, with the following differences:

1. If both FDs are engaged in the VERT SPEED mode, only the captain's pitch command bar will be visible and the captain's VSI white command bug will control the vertical speed demand.
2. The TURB mode is not available to the flight director.
3. With only the flight director engaged, use of the autopilot datum adjust zeroes the FD pitch command bar.

Approach, Landing and Go Around - The approach, landing and go around are selected on the flight director in the same way as for the autopilot, with the additional facility of BACK BEAM.

NOTE: In order to obtain LAND 3 capability on the autopilot, it is necessary to have at least one flight director engaged.

Switching - The normal position of the FD1/FD2 switches is outboard so that the captain has FD1 selected and the first officer FD2. The FD in use is indicated by a flag on each ADI. It is possible for either FD to supply both ADIs by use of the FD1/FD2 switches. However an interlock will prevent both FD switches being in the inboard position at the same time.

Disengagement - Flight directors are normally disengaged using the switches on the AFCS controller. They will automatically disengage at an aircraft pitch attitude of 20° or an incidence of 18° accompanied by the FD flags on the ADIs.

INERTIAL NAVIGATION SYSTEM

Normal Procedures - Those INS procedures which are carried out either during cockpit preparation or as check list items, are described in the NORMAL PROCEDURES section of the Flying Manual.

Navigation - The aircraft will normally be operated during the en-route phase of flight with the autopilot engaged in the INS mode.

When following subsonic airways, the primary navigational aid will be the point source airways facilities i.e. VOR, NDB, DME. The autopilot may still be used in the INS mode, but at least one HSI should be selected to RAD and the aircraft's position monitored by reference to the airways facilities.

Accuracy - To prevent placing sonic booms outside the flight corridor, it is necessary that the supersonic portion of the flight should be flown with the greatest accuracy.

Mix - To assist in accurate route flying, the INS are always used in the Mix mode.

DME Updating - To further increase the accuracy of the INS, the Mixed position may be updated by ranges from either one or two DME stations.

Automatic Data Entry Unit (ADEU) - An ADEU card reader may be used to insert the DME station data and waypoints into the computers of numbers 1 and 2 INS.

(To insert DME station data refer to the Flying Manual NORMAL PROCEDURES).

ADEU ERROR Light Illumination During Card Insertion - The ERROR light on the ADEU will illuminate if the ADEU detects a card read error. Before starting another card read operation the ERROR light must be pressed and put out. If necessary the ADEU can be restarted by pressing the AUX START button.

INS WARN Light Illumination During Card Insertion - The CDU warn light will illuminate if the data from the ADEU fails a reasonableness test. If this occurs set data selector to DSRTK/STS and verify that action code 05 with malfunction code 55 are present. The malfunction code should be cleared and the card reinserted.

DME Station Data Verification - Verification that the DME station data has been correctly loaded must be carried out separately for each INS, except that if the data has been loaded by the REMOTE function, only the receiving INS need be verified.

DME Data Display - To display DME station data for verification:

1. Set waypoint/DME selector to desired DME station number.
2. Set data selector to WAY PT.
3. Press keys 7 and 9 simultaneously.
   The latitude and longitude of the DME station appear in the lefthand and righthand data displays respectively.
4. Press keys 3 and 9 simultaneously.
   The altitude of the DME station in thousands of feet, and the frequency of the DME station in MH_z appear in the lefthand and righthand displays respectively.
   (e.g. ------- 8 = 8,000 ft. $11^{o}05.0 = 110.50$ MH_z).

INERTIAL NAVIGATION SYSTEM

Manual Insertion of DME Station Data - If no DME data card is available the DME station data may be inserted manually as follows:-

1. Set data selector to WAY PT.
2. To insert data into INS numbers 1 and 2 simultaneously press REMOTE keys on both INS.
3. Set waypoint/DME selector to the number of the DME station to be loaded. (This number may be chosen quite arbitrarily provided a different number is used for each DME station).
4. Simultaneously press keys 7 and 9.
5. Load latitude of DME station and INSERT.
6. Load longitude of DME station and INSERT.
7. Simultaneously press keys 3 and 9.
8. Press key 2 or 8. This enables DME station altitude to be loaded.
9. Load DME station altitude to nearest thousand feet (e.g. 6,800 ft = 7, 12,300 ft = 12) and INSERT.
10. Press key 4 or 6 to enable DME station frequency to be loaded.
11. Load DME frequency by pressing the appropriate five keys in sequence (e.g. 117.5 MH_z = 11750) and INSERT.
12. Repeat steps 3 - 11 for each DME station.

Pre-Start Checklist - The Captain will read the present position from the Aerodrome Folder and this should be checked on his own INS by each crew member who will circle the present position written on his own Flight Log.

The Captain will then read from his own Flight Log the name of the first waypoint and this will be checked and numbered by each crew member on his own Flight Log. The Captain will read out the co-ordinates of that waypoint which will be checked by each crew member and when confirmed correct he will circle the number for that waypoint.

This procedure will be used to check a minimum of three waypoints at this time. The remaining waypoints may be checked if time is available (awaiting load sheet possibly) but they MUST be checked at a convenient time before that leg becomes active.

Mix Mode - Providing that all three INS are serviceable in the NAV mode, the INS positions are intermixed and the optimum position used by each INS in its individual computations. Each CDU displays this optimum position. Mixing is not possible with only two INS serviceable.

To select the Mix Mode refer to the NORMAL PROCEDURES section of the Flying Manual.

DME Updating - No.1 DME provides data to No.1 INS and No.2 DME provides data to No.2 INS.

To select a DME station for updating:

1. Tune DME to selected DME station.
2. Set data selector to DIS/TIME.

INERTIAL NAVIGATION SYSTEM

3. Set waypoint/DME selector to number of selected DME station.
4. Simultaneously press keys 7 and 9. The FROM side of FROM-TO display goes blank and the number of the previously selected DME station flashes on and off in TO side.
5. Verify that the distance to the selected DME station as displayed in lefthand data display agrees approximately with the corresponding DME reading on the DME indicator.
6. Press WY PT CHG key. The WY PT CHG and INSERT keys light and TO side of FROM-TO display stops flashing.
7. Press key corresponding to number of selected DME station. The selected DME station number appears in TO side of FROM-TO display.
8. Press INSERT key. The INSERT and WY PT CHG keys go out and TO side of FROM-TO display flashes on and off.
9. If a second DME station is available repeat the above steps on the second INS.

NOTE: The RNAV light will be on only while DME up-dating is taking place.
When INS 1 or INS 2 is receiving DME data it will pass the data to the other two systems. If these systems are in Mix mode (MI=4), they will independently perform the DME update function.

Position Update Eradication (FLUSHING) - Position update eradication is not considered a common procedure. It should only be used when an operational error has resulted in an erroneous position fix.

To select the mode:-

1. Set data selector to DSRTK/STS.
2. Press key 1 and INSERT.

The INS is now in the Position Update Eradication mode, and all position correction data, including DME derived data is removed. The INS automatically reverts to independent and operation (MI=5).
To return to normal Mix operation in which position updates wil be accepted:-

Press key 4 and INSERT.

OR

To return to unmixed mode
Press key 5 and INSERT.

Present Position Check -

1. Set data selector to POS.
2. Press HOLD key when aircraft passes over a known position.

NOTE: If more than one INS is being checked and updated, the HOLD keys on all INS should be pressed simultaneously.

3. Compare displayed latitude and longitude with latitude and longitude of known position.
4. Press HOLD key to return the INS to normal operation.

INERTIAL NAVIGATION SYSTEM

To Display Present Inertial Position After Updating or Mixing

1. Set data selector to WAY PT.
2. Press HOLD key.

   The HOLD key will light and latitude and longitude of present inertial position will be displayed.
3. To return INS to normal operation, press HOLD key. The HOLD key light will go out.

To Confirm Presence of In Flight Update -

1. Press HOLD key.
2. Set data selector to POS and then WAY PT. If displays change an in flight update is present.

Insertion of Additional Waypoints - If not inserted during Cockpit Preparation or if flight plan is changed, additional waypoints may be inserted manually or by card reader using the same procedure as in Cockpit Preparation. Refer to Flying Manual NORMAL PROCEDURES. To avoid immediate automatic switching to a new leg, do not insert new waypoint data into a waypoint shown in the FROM-TO indicator.

Manual Flight Plan Change - The flight plan can be changed at any time. If the change is made between waypoints, 0 will normally be loaded in the FROM side of the FROM-TO display. When this is done, the present position co-ordinates that exist when the INSERT key is pressed will be entered into waypoint 0. The new desired track will be the great circle between the new waypoint 0 and the waypoint shown in the TO display.

If a waypoint other than 0 is loaded in the FROM display, the new desired track will be a great circle between the FROM and TO waypoints regardless of the aircraft's present position. Cross track error and track angle error outputs will be related to this desired track.

To change the waypoints in the FROM-TO display:

1. Press WY PT CHG, the WY PT CHG and INSERT keys light.
2. Select new FROM and TO waypoints by pressing corresponding keys in sequence. New waypoint numbers appear in FROM-TO display as keys are pressed.
3. Press INSERT key, WY PT CHG and INSERT keys go out.

Distance and Time - To display distance and time to the next waypoint rotate the data selector to DIS/TIME. The distance displayed in the lefthand display is that from the present position to the next waypoint (i.e. the waypoint appearing in the TO display). The time displayed in the righthand display is that required to fly to this waypoint at the current ground speed.

Continued........

INERTIAL NAVIGATION SYSTEM

If the distance and time is required between the waypoints displayed in the FROM-TO display, press the WY PT CHG key. The WY PT CHG and INSERT keys will light, and the distance and time will be displayed in the lefthand and righthand displays respectively. Any two previously inserted waypoints may now be loaded into the FROM-TO display. The distance and time between these two waypoints will be displayed.

CAUTION: DO NOT PRESS THE INSERT KEY UNLESS A CHANGE OF TRACK IS REQUIRED.

To revert to the original distance time display press the CLEAR key.
The WY PT CHG and CLEAR key lights will go out.

In Flight Accuracy Index Number - In the NAV mode, the 5th digit of the status display indicates, with DSR TK/STS selected, the degree of confidence that can be placed in the navigational accuracy. Confidence is greatest at 1, least at 9.

Action Code 02 - Malfunction Code 56 - This is caused by an I.N.U. detected difference, between updated C.D.U. displayed position and raw data position, of greater than 3 + 3t. (i.e. 3 nm + 3 times flight time in hours). The red warning light will be cancelled by the test button during interrogation of the Malfunction Code.

Category 2 and 3

General - Concorde is certificated to operate to Category 3 minima.

BA policy requires that any approach which is commenced with the intention of non-visual flight below Cat 1 minima, (DH 200 ft. RVR 600 m) must be initiated as an automatic landing.

The procedures defined in this section assume the full use of autoland. Failure cases, and procedures are specified.

Concorde Navigation Manual specifies all the authorised autoland runways, with instructions covering unserviceability of facilities, flight initiation rules for Cat 2 and 3 operations, the visual reference required at decision height, use of RVR reports, initiation of missed approach, and the determination of decision height.

Refer to "Autopilot" in this section of the Flying Manual for normal operating procedures of autoland, and go-around modes.

Pilots and Flight Engineers have been issued with the BA Booklet "The Background to All Weather Operations". The Flying Manual covers fully the basic requirements and limitations for Category 2 and 3 Autoland. Complete familiarity with these documents is essential.

The use of minima as low as 100 ft DH/400m RVR (cat 2) and 15 ft DH/250m RVR (cat 3) calls for clear cut decision making at low altitude. It must be borne in mind that Category 2 is still "see to land". When below decision height whenever the visibility is inadequate to comply with the monitoring requirements for alignment with approach and runway lights or markings, a go-around MUST be commenced.

If, during a Category 2 or Category 3 approach, it becomes necessary to revert to manual control above ILSC decision height, ILSH RVR will apply. If manual reversion occurs at or below ILSC decision height, the approach may be continued provided that the RVR is at or above that required for a coupled approach The exceptions to the above are:-

(a) If complete autopilot disconnect occurs in the flare in Category 2 RVR conditions and the aircraft is over the runway so that a safe manual landing and roll out are feasible, the landing may be continued.

(b) In Category 3 conditions, if a total autopilot disconnect occurs during the flare above decision height, a go-around is assumed.

Below decision height, the landing may be continued at the Captain's discretion.

The cat 3 RVR/DH (250m/15ft) relationship should allow a pilot to expect to establish visual contact at not less than 40 ft and to see an increasing sequence of lights to a minimum of three consecutive lights by decision height of 15 ft.

Bear in mind that go-around can be safely commenced from the flare and initial touchdown.

NOTE: When an autocoupled approach and landing in conditions better than Cat 2 or 3 is made, it is the pilots responsibility to check that the sensitive area is clear of other aircraft.

ALL WEATHER OPERATION

Authorisation - Each Captain and First Officer will only be trained in his own Category 2 or 3 duties. Authorisation will be limited to that capacity. Only Training Captains and Nucleus Group Captains may act as First Officer if the weather is worse than Category 1. A First Officer may not handle the controls for such an approach.

Procedures

Before Flight - Comply with the flight initiation requirements as stated in the Concorde Navigation Manual.

The minimum equipment level for initiation of an autoland in Cat 2 or 3 conditions, must be confirmed as available before departure if planning to use either destination or alternate in Cat 2 or 3 weather. Consult the minimum equipment list. Pre-flight checks should always cover these items.

Before Approach - Check the wind is within limits. Crosswind 15 kt max, tailwind 10 kt max, and headwind 25 kt max. Check that the equipment required for the approach is serviceable, so that Category 2 or 3 capability can be achieved by the autopilot system.

Land 3 status requires,

LAND mode engaged.
Both Autopilots engaged.
Flare law test successful.
One Landing Display serviceable.
All elevons in electrical signalling mode.
PCUs serviceable.
One autothrottle in IAS ACQ mode.
Both ADCs serviceable.
One Flight Director serviceable and engaged.
INS comparator serviceable.
INS 3 serviceable in NAV or ATT mode.
Relay Jack hydraulic pressure (Green or Yellow) satisfactory.
ILS QDM set on VOR/LOC selectors identical.
AC and DC electrics split.

Land 2 status requires:

LAND mode engaged.
One Autopilot engaged.
Flare law test successful.
One Landing Display serviceable.
All elevons in electrical signalling mode.
PCUs serviceable.
One Autothrottle in IAS ACQ mode.

Continued.....

ALL WEATHER OPERATION

Localiser Interception - Initial approach should be flown using HDG TRK and ALT HOLD modes. Landing Displays will indicate deviations when the AP or FD is selected to an approach mode, and ILS signals are strong enough to withdraw flags.

WARNING: THE AUTOPILOT WILL CAPTURE THE FIRST GLIDE SLOPE AND LOCALISER SIGNALS RECEIVED. PREMATURE SELECTION OF LAND MODE MAY RESULT IN CAPTURE OF FALSE BEAMS.

Close in interception of the ILS localiser is not recommended due to the turning radius at the minium recommended airspeed of V_{REF} + 30. Advise ATC of the intention to commence an autoland, and request a minimum intercept distance of 10 n.m. This should be satisfactory for intercept angles of up to 45 degrees.

The autopilot will capture a glide slope from above, provided the rate of descent does not exceed 2000 ft/min

Select LAND mode when close to the ILS centreline, having checked from ADF, VOR, or other information sources that alignment is correct. The second autopilot may now be engaged. Prime lights will illuminate for LAND, VOR/LOC, AND GLIDE modes. ILS deviations are displayed on the landing displays.

Localiser Capture - This is indicated by illumination of VOR/LOC light (prime light off), and the appropriate indications of localiser displacement on deviation displays, ADIs and HSIs.

Confidence Check - This should be made to confirm the changeover from AP 1, the controlling autopilot, to AP 2, by disengaging AP 1 switch. The autopilot system should remain in capture mode and the Landing Displays indicate Land 2. Re-engage AP 1 and confirm status still Land 2, or Land 3 with AC and DC electrics split.

Glideslope Capture - This is indicated by a momentary illumination of GLIDE light followed by illumination of LAND light (prime light off) and extinguishing of the VOR/LOC light. The ALT HOLD light will also extinguish. Monitor the flight instruments for correct indications of ILS displacement. Complete the landing check and begin to reduce airspeed towards the target.

Beam Sensitivity Reduction - With LAND mode engaged, beam sensitivity is reduced progressively within the autopilot, to compensate for increased ILS beam sensitivity as the aircraft descends. The localiser beam reduction is 1/3 from 1000 ft to 100 ft, and the glide slope reduction is 1/6 from 2000 ft to 100 ft. Bank angle limits are reduced from 30° at 1000 ft to 2° at 100 ft.

(Deletion)

Height Warnings - Audio warning approaching DH starts at DH + 70 ft and increases in intensity progressively until ceasing at bugged DH. The DH amber light on each ADI indicates that the aircraft is at or below the bugged height on either of the radio altimeters.

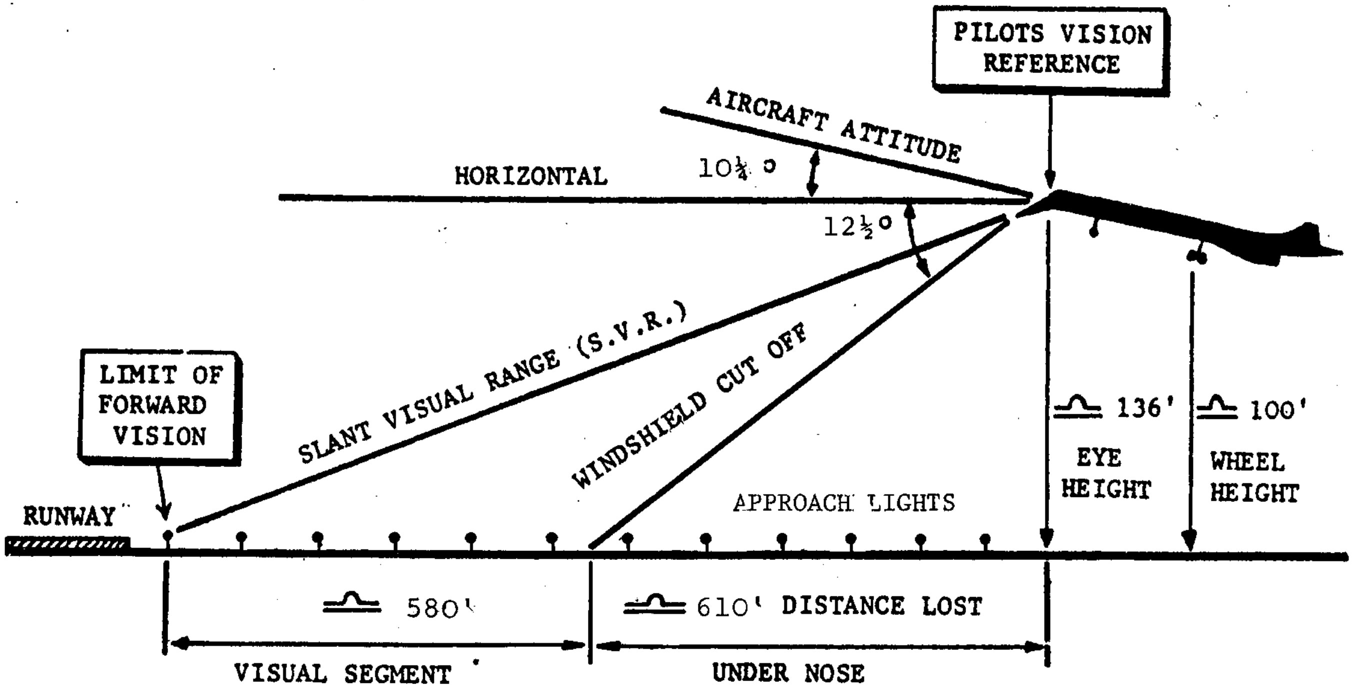
The DH circular amber lights on the Landing Displays indicate that the aircraft is at or below the bugged height on the associated radio altimeter.

ALL WEATHER OPERATION

The rising runway symbol on each ADI begins to indicate in 50 ft increments at 200 ft RA. The Captains radio altimeter supplies the First Officer's ADI and vice versa.

VISUAL REFERENCE TERMINOLOGY

Note that the visual segment is the horizontal component of the Slant Visual Range (SVR) less the distance cut-off by the coaming - the latter decreasing with height.



12½° NOSE DROOP

WHEEL HEIGHTS OVER THRESHOLD (ASSUMING AIRCRAFT IS IN CENTRE OF ILS GLIDESLOPE, GLIDE SLOPE ZERO POINT IS 1000 FT. FROM THRESHOLD AND PITCH ATTITUDE IS 10¼°

EXAMPLE:-

ILS	3° GLIDESLOPE
WHEEL Ht	31.6 Ft
GLIDESLOPE AERIAL Ht.	52.4 Ft.

(Unchanged)

VARIATIONS IN THESE VALUES CAN OCCUR DUE TO

1. WINDSHEAR EFFECT.
2. GROUND INSTALLATION TOLERANCES
3. SPECIFIC INSTALLATIONS e.g. DIFFERING REFERENCE POINTS.

WARNING: REFER TO AUTHORISED LIST OF AUTOLAND RUNWAYS IN NAV. MANUAL AND UPDATED BRIEFING INFORMATION BEFORE LANDING. OBSERVE WIND COMPONENT LIMITS.

ALL WEATHER OPERATION

Crew Duties

Flight Engineer - Monitors N2 gauges during final approach, and must immediately call "engine failure" if applicable. He should monitor warning lights, AUTO LAND lights, and Landing Displays, and call a failure should the First Officer fail to do so. He should also make the standard height calls. See 08.33.13.

First Officer - Monitors the instruments EXCLUSIVELY down to and including the flare. He will call any failure indications when detected, and will monitor the raw ILS displacement indications for significant deviation.
He will be briefed to call:
(a) Alert height Cat 3 (or Cat 2 or Cat 1 as appropriate) at 300 ft RA.
(b) "100 feet to go" at Decision Height + 100 ft R.A.
(c) "Decision Height" at Decision Height R.A.

He will call "go-around mode" when the caption illuminates in the event of an automatically controlled go-around.

Captain - Before commencing an approach in Cat 2 or 3 (or potentially below Cat 1) weather, he must establish that his First Officer is qualified.

The Cat 3 and 2 DH and RVR must be nominated, and the Cat 1 DH and RVR should be noted for use in the event of reversion.

He will utilise the AFCS to position the aircraft on to the ILS beam, with LAND mode engaged, check that correct indications are obtained on the Landing Displays, and other flight instruments.

The confidence check and flare test will be completed and the status on the Landing Displays must be noted. The LAND caption must in any event be illuminated by 700 feet.

The pilot is the master monitor, and progress should be continuously assessed. He should follow through on the flying controls and autothrottles during the final approach below 1000 ft R.A.

At 300 ft., the Alert Height, should the Co-pilot's call be "Cat 1," the autopilot should be disengaged by 100 ft R.A. at the latest, and a manual go-around or landing carried out, using Cat 1 minima.

(Deletion)

At the Alert height (300 ft R.A) he should begin to include the outside forward view in his scan, (it is imperative that First Officer and Flight Engineer's scans remain firmly inside the flight deck to observe and call immediately any failure indications which would necessitate a go-around). He is required to assess the availability of satisfactory visibility to continue the approach to a landing, and that the aircraft is correctly aligned.

Concorde criteria are:

1. A minimum of 3 centre line approach lights or runway lights should be visible at all times below Decision Height, to enable assessment of alignment and cross track rate.

ALL WEATHER OPERATION

2. The lateral alignment of the aircraft on achieving visual contact, shall be such that the flight deck is positioned within the approach light pattern, and tracking close to the centreline in order to secure a landing well within the runway width.

At Decision Height. Announce "Continuing" or "Go-around" as applicable.

Be ready to initiate go-around action below Decision Height should visibility deteriorate.

At 100 ft R.A. glide slope signals are no longer used for guidance, which is now provided by inertially computed and augmented vertical velocity information, assessed to determine engagement of Flare Mode. With vertical velocity within normal limits the flare should commence at 50 ft R.A. The flare would be delayed if vertical velocity was lower than normal, but should always commence at 35 ft R.A. at the latest.

On main wheel contact, disconnect the ATs, and AP. Close the throttles fully, as they will still be at the autothrottle idle stop of 37½°, and lower the nosewheel smoothly onto the ground. Use normal reversing technique.

During rollout use rudder inputs to maintain alignment close to runway centreline. As speed is reduced monitor INS groundspeed. Avoid sharp turns in reduced visibility, unless at low speed. Be careful to identify correct turn off.

Automatic Go-Around - The Captain calls "Go-around", disconnects autothrottles, and advances throttles fully. Any two throttles advanced to more than the 95% N2 position will engage GO AROUND mode.

The caption will illuminate, pitch attitude of 15° will be acquired, wings level, constant heading, with bank angle authority limited to 10°.

The mode must be disengaged by 1000 ft above airport level, this being achieved by selecting HDG HOLD, then PITCH HOLD or by disengagement of AP. Landing gear should not be selected up until a positive climb is confirmed.

The First Officer must monitor instruments and call "Go around mode" when caption illuminates.

At 250 kts engage autothrottles. Confirm that go-around height has been set on the Altitude Select, then prime ALT ACQ.

Go-around Manual Undirected - The Captain calls "Go-around", disconnects autothrottles, and advances throttles fully. Rotate the aircraft to pitch attitude 15°, and accelerate to V_{REF} + 50.

Landing gear should not be selected up until a positive climb is established.

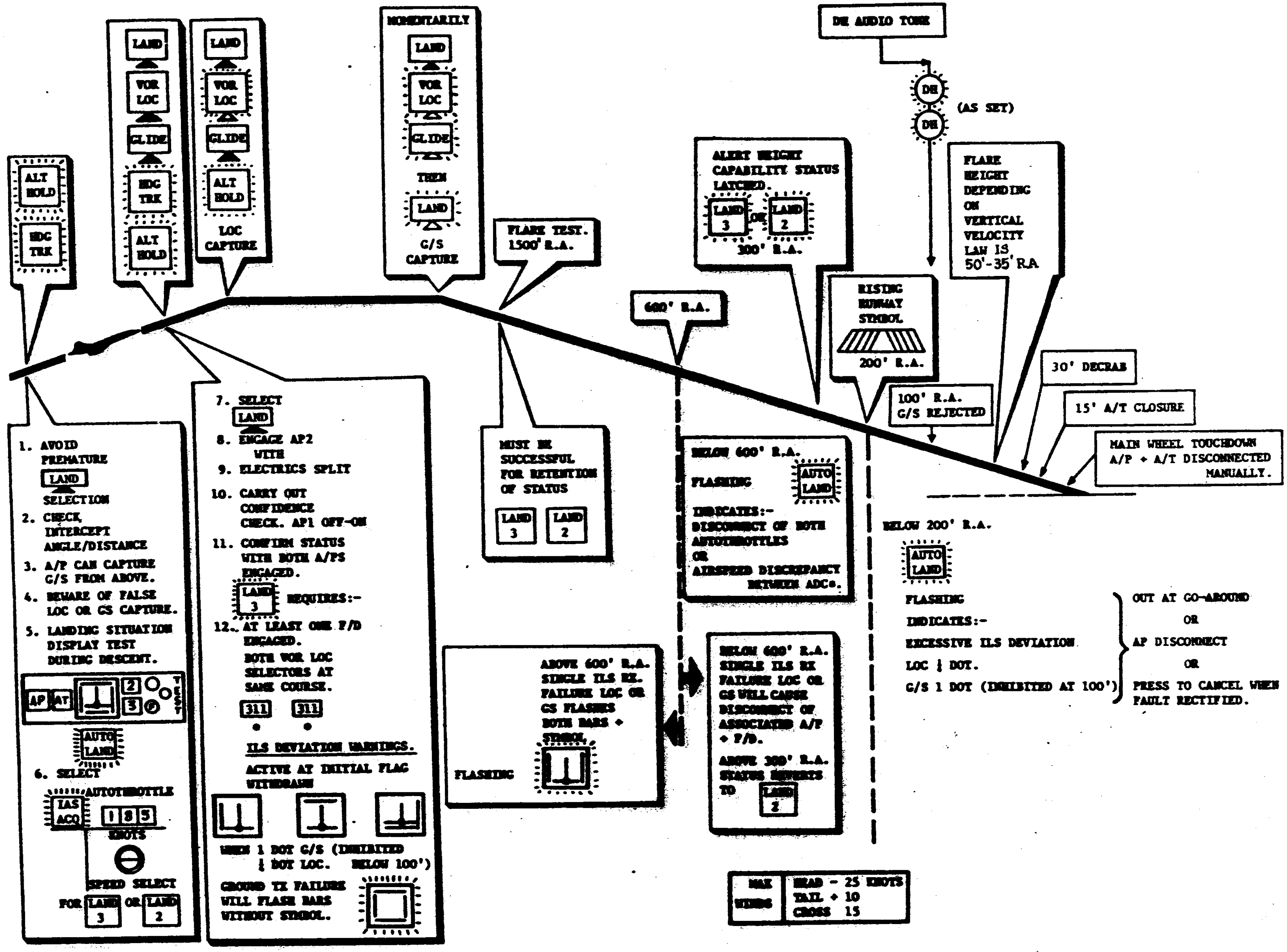
Power should be reduced as required once V_{REF} + 50 has been achieved, to contain climb rate. Maximum pitch attitude should be 20°.

Anticipation of power reduction requirement is necessary, particularly when go-around heights are lower than 3000 ft above airfield height.

(Unchanged)

ALL WEATHER OPERATION

(Unchanged)



1. AVOID PREMATURE LAND SELECTION
2. CHECK, INTERCEPT ANGLE/DISTANCE
3. A/P CAN CAPTURE G/S FROM ABOVE.
4. BEWARE OF FALSE LOC OR GS CAPTURE.
5. LANDING SITUATION DISPLAY TEST DURING DESCENT.
6. SELECT AUTOTHROTTLE IAS ACQ 185 KNOTS SPEED SELECT FOR LAND 3 OR LAND 2
7. SELECT LAND
8. ENGAGE AP2 WITH
9. ELECTRICS SPLIT
10. CARRY OUT CONFIDENCE CHECK. AP1 OFF-ON
11. CONFIRM STATUS WITH BOTH A/PS ENGAGED.
LAND 3 REQUIRES:-
12. AT LEAST ONE F/D ENGAGED.
BOTH VOR LOC SELECTORS AT SAME COURSE.

ILS DEVIATION WARNINGS.
ACTIVE AT INITIAL FLAG WITHDRAWN
WHEN 1 DOT G/S (INHIBITED BELOW 100')
½ DOT LOC.
GROUND TX FAILURE WILL FLASH BARS WITHOUT SYMBOL.

MUST BE SUCCESSFUL FOR RETENTION OF STATUS
LAND 3 LAND 2

ABOVE 600' R.A. SINGLE ILS RX. FAILURE LOC OR GS FLASHES BOTH BARS + SYMBOL.
FLASHING

BELOW 600' R.A.
FLASHING AUTO LAND
INDICATES:-
DISCONNECT OF BOTH AUTOTHROTTLES
OR
AIRSPEED DISCREPANCY BETWEEN ADCs.

BELOW 600' R.A. SINGLE ILS RX FAILURE LOC OR GS WILL CAUSE DISCONNECT OF ASSOCIATED A/P + F/D.
ABOVE 300' R.A. STATUS REVERTS TO LAND 2

BELOW 200' R.A.
AUTO LAND
FLASHING
INDICATES:-
EXCESSIVE ILS DEVIATION
LOC ½ DOT.
G/S 1 DOT (INHIBITED AT 100')

OUT AT GO-AROUND
OR
AP DISCONNECT
OR
PRESS TO CANCEL WHEN FAULT RECTIFIED.

MAX WINDS	
HEAD	- 25 KNOTS
TAIL	+ 10
CROSS	15

ALL WEATHER OPERATION

Failure Warnings

AUTO LAND red flashing lights indicate:

Below 600 ft R.A.

1. Total loss of autothrottle system.
2. Airspeed discrepancy.

Below 200 ft R.A.

1. or 2 above
3. Excess ILS localiser or glide slope deviation.
4. ILS ground transmitter failure.
5. Double ILS receiver failure.

ACTION -

Without visual reference	- Automatic Go-around
With visual reference (provided RVR at or above ILSH minimum)	- Disengage AP and ATs. Continue manually. (If below 500 ft use existing target speed).

WARNING: IF ADS WARNING RECEIVED, USE STANDBY ASI IMMEDIATELY.

The AUTO LAND lights are cancelled by engagement of Go-Around mode, disengagement of autopilot and Flight Directors, or by pressing either light provided failure condition has been removed.

AP red lights - Indicate total loss of autopilot control. Accompanied by brief audio cavalry charge. Operation of either control column instinctive disconnect will cancel the lights.

ACTION -

Without visual reference	- It is permitted to re-engage AP if above 1000 ft. Below 1000 ft, revert to manual minima, and continue approach manually provided within minima, or go-around manually.
With visual reference	- Provided RVR within manual minima continue approach manually, otherwise go-around manually.

CAUTION: ALWAYS MONITOR TOUCHDOWN RVR. EVEN THOUGH SLANT VISIBILITY ON FINAL APPROACH MAY BE ACCEPTABLE, HORIZONTAL VISIBILITY CAN REDUCE CONSIDERABLY IN DEEPENING FOG CONDITIONS.

ILS Deviation Lights - In the event of discrepancy between signals fed to each Landing Display, a comparator ensures that the least favourable case is shown on both displays. The system is set to warn with a localiser deviation of ¼ dot, and glide slope deviation of 1 dot (inhibited below 100 ft R.A.). These indications are accompanied by the aircraft amber symbol light.

Monitor HSI and ADI indications.

NOTE: It is possible to transfer ILS signals from Captains HSI to First Officer's HSI and vice versa. The autopilots are however hard wired to the appropriate side and cannot use transferred information.

Flashing Deviation Lights

1. Indicate ground transmitter failure.
   Aircraft symbol remains extinguished.
   Below 200 ft. R.A. this warning is accompanied by the AUTOLAND lights flashing.
2. When accompanied by the aircraft amber symbol light indicate an aircraft ILS receiver failure.
   Below 600 ft. in LAND mode automatic disengagement of the associated AP and FD will occur.

AT red flashing lights - Indicate total loss of autothrottle control (also that AT has not been primed when ALT ACQ capture mode is engaged, if using AP or FD, or if AT not selected at instant of glide slope engagement during automatic approach).

The warning is accompanied by the AUTO LAND lights if below 600 ft R.A.

Disengage AP and continue manual approach, or go-around automatically. (If below 500 ft use existing target speed).

Autopilot Disconnect Failure of ILS data

Below 600 ft R.A.

Single glide slope or localiser failure of aircraft receiver will disconnect the associated AP and FD.

ACTION -

When using both APs, the other AP will takeover. Check status, if Land 2 continue automatic approach and landing to Cat 2 minima

When using single AP, continue approach manually, or go-around.

(Unchanged)

NOTE: ABOVE 600 FT R.A. a single glide slope or localiser failure will not disconnect AP. Localiser or glide slope indications will disappear, warning flags will appear and the aircraft will continue along the flight path immediately preceding the failure. The associated F.D. bar is withdrawn.

ACTION -

Above 1000 ft

1. Disengage associated AP by engage switch.
2. Engage other AP.

Below 1000 ft Single AP operation

1. Disengage associated AP by engage switch.
2. Continue manual approach.

PROCEDURES AND TECHNIQUES

ALL WEATHER OPERATION

Below 1000 ft Dual AP operation

1. Disengage associated AP by engage sw.
2. Continue automatic approach.

Below 200 ft R.A.

Double simultaneous failure of localiser or glide slope receivers will be recognised as a transmitter failure and will not disconnect AP, but will illuminate the AUTOLAND red flashing lights. This allows an automatic GO AROUND selection.

RADIO ALTIMETER FAILURE

CAPTAIN's R.A. FAILURE

Both A.D.I decision height warning lights are operative. The audio D.H. warning and Captain's rising runway symbol are operative from Co-pilot's R.A.

In LAND mode API would disengage below 1500.

ACTION

Use AP2 normal drills. Land 2 status is available.
E/O will make normal R.A. calls down to and including 50' from Co-pilots R.A., below which parallax precludes further calls.

CO-PILOTS R.A. FAILURE

Both ADI Decision Height Warning lights are operative. The audio D.H. warning and co-pilots rising runway symbol are operative from Captains R.A.
In LAND mode AP2 would disengage below 1500'.

ACTION

Use AP1. Normal Drills.
Co-pilot calls "100 to go" and "Alert Height" on the basis of E/O's normal calls and "Decision Height" from ADI DH light and audio. Co-pilot must stay on instruments throughout and avoid breaking his scan by reference to Captains RA.

GPWS PULL-UP OR GLIDESLOPE WARNING

If a "Pull-up" warning occurs during an automatic approach carry out an immediate go-around. This can be an automatic go-around provided that LAND or GLIDE mode is engaged.

If a "Glideslope" warning occurs during an automatic approach regain the glideslope expeditiously. Continue approach or go-around as conditions permit.

Additional Background Information. All Weather Operations

The Training Manual Vol.1 contains further information, which is referred to during the ground training syllabus. Subjects include:

Fog characteristics, RVR, Safety analysis, Visual segment lengths versus apparent pitch attitude, ILS standards, Protected areas, ATC separation standards.

Alert Height

Alert Height is defined as a height based on the characteristics of the aircraft and its equipment, above which a Cat 3 approach must be discontinued by go-around or adjustment of minima, if a significant degradation occurs in the system required for a cat 3 landing.
Thus below 300 ft the Land 2 or 3 capability is designed to be latched, 300 ft being the alert height for our aircraft.

Category 2 and 3 Briefing

Suggested form

This is reproduced on the clipboard aide memoire.

Minimum DH/RVR for approach is ..... In the event of reversion to Cat 1 or ILSH minima DH/RVR become ....." Go-around if required will be automatic except after autopilot failure.

If ILS deviation lights flash) BELOW 200 ft and DH
AUTO LAND lights flash) GO-AROUND IS MANDATORY
AP disconnect warning) unless visual reference is satisfactory with RVR in excess of ILSH minimum.

The First Officer must stay on instruments throughout.
Routine calls will be ....'
The Flight Engineer will monitor N2 gauges and warning lights.

(Unchanged)

ALL WEATHER OPERATION

3 Engined Approach to Cat.2 and 3 Minima (Pre-meditated)

No special procedure is required. A full autoland is preferable to disengagement of AP at low altitude, as any residual trim problems will be minimised.
The rudder trim should be set to zero by 500 feet at the latest. (Remember to maintain rudder/sideslip co-ordination in the event of AP disengagement prior to touchdown). VREF + 5 Target Speed with VREF + 10 maximum.

Engine Failure during automatic approach and landing. Cat.2 and 3 minima

The autopilot should contain an engine failure during coupled approach, and is certified to Category 3 standard for 3 engined approach and autoland. Tests have shown that only very small deviations from the localizer and glideslope are likely.

All drills and procedures, including the normal landing check, must be completed before 600 feet R.A., or the approach should be discontinued, and a go-around initiated.

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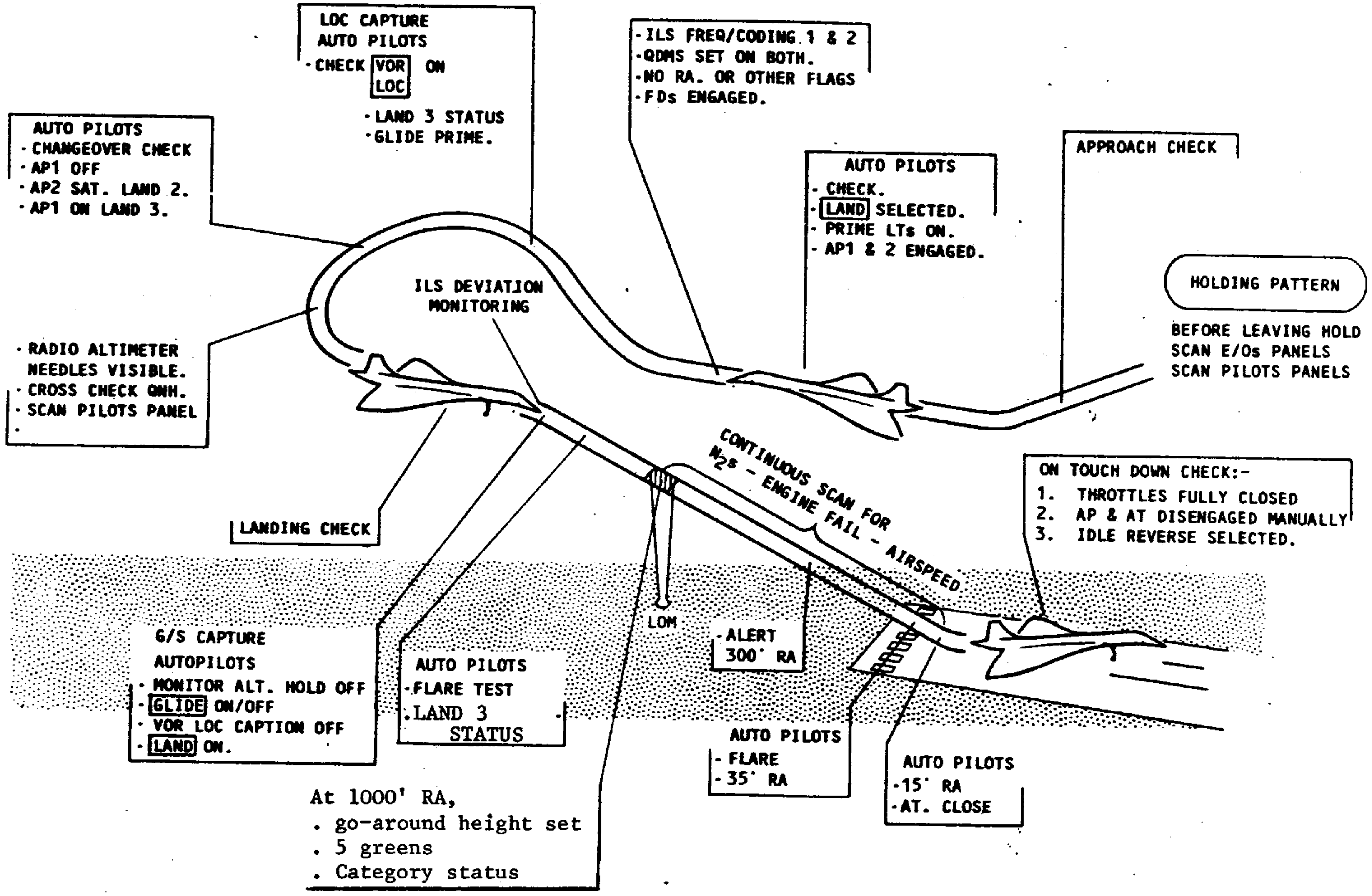
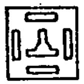
(Deletion)



AUTOLAND CAT 3 - APPROACH PROFILE

AUTO PILOT
GLIDE & LAND MODES
ABNORMAL PROCEDURES

WARNING	CAUSE	ACTION	
		WITHOUT VISUAL REFERENCE	WITH VISUAL REFERENCE
AP red + audio	Both APs disengaged	CAT 1. Go-around or continue under manual control CAT 2.) Go-around CAT 3.)	Continue under manual control Note: If above 1,000ft. an attempt may be made to re-engage one or both autopilots.
AT red flashing	Both ATs disengaged	CAT 1. Auto-go-around or disengage AP & FD and continue under manual control CAT 2.) Auto go-around CAT 3.)	Disengage AP & FD and continue under manual control
AUTO LAND red flashing	Unsatisfactory ILS performance, ILS failure or ADS failure	Auto go-around	Disengage AP & AT and continue under manual control. Note: If accompanied by ADS warning, revert to standby ASI immediately
Capability indicators blank at 300ft. (No LAND 2 or LAND 3 indication)	Necessary crew actions incomplete or failure of essential system	Disengage AP at not less than 100ft. and make a manual landing	

WARNING	CAUSE	ACTION	
		WITHOUT VISUAL REFERENCE	WITH VISUAL REFERENCE
 One bar + symbol - steady	Excessive deviation from ILS centre line	Check ILS deviation. If error persists: CAT 1. Auto go-around or continue under manual control CAT 2.) CAT 3.) Auto go-around	Check flight path. If unsatisfactory disengage A and continue under manua control.
Two opposite bars + symbol - flashing	Failure of ILS receiver associated with controlling AP	CAT 1. Auto go-around or continue under manual control using serviceable receiver CAT 2.) CAT 3.) Auto go-around	Disengage controlling AP & continue under manual control
		Note: If above, 1,000ft. the second AP may be engaged.	
Two opposite bars - flashing Symbol not illuminated	Failure of ILS transmitter	Auto go-around	Disengage controlling AP & continue under manual control.

Notes : (1) Below 600ft. in LAND mode failure of an ILS receiver causes disengagement of the associated AP and the bars and symbol do not flash.

(2) Below 200ft. excessive ILS deviation and ILS transmitter failure case the AUTOLAND warning to flash. Actions appropriate to that warning must be taken.

CREW INCAPACITY

General - Incapacitation in any crew member may not be immediately apparent. Proper monitoring is the best means of ensuring that partial or total incapacity is not ignored. When doubt exists question the individual concerned, repeating once if necessary, and if no responsible reply is received incapacitation may be assumed.

Cabin crew should be summoned to remove the crew member from his seat except during those stages of flight e.g. take-off and landing, when it would be safer to lock the pilot's harness and move his seat to the fully aft position. The engineer officer should always be moved from his seat.

Procedures -

(1) The first action is to maintain the required flight path making optimum use of the automatic pilot. If on approach go-around action might be advisable.

(2) If the Captain is incapacitated the nominated second in command should clearly state "I have command". He should handle the aircraft from the right hand seat.

(3) If the Flight Engineer is incapacitated the First Officer should occupy the engineer's seat.

(4) Declare an emergency to get maximum assistance from the ground.

(5) Any supernumerary crew member may be used to carry out any duties consistent with his training and qualifications.

TAXY POSITIONING OF AIRCRAFT

Occasions will arise when aircraft have to be re-positioned from one part of an airfield to another by taxying; the minimum crew in this case is Captain and Flight Engineer.

The following items summarise the procedural changes that apply:-

PRE-START

1. At London the crew will be required to provide their own Flying Manual, Vols. 2A and 2B.
2. Normal transit procedures will apply, omitting items that have no relevance to a taxy positioning manoeuvre.
3. To safeguard aircraft balance, fuel must be distributed in accordance with the appropriate fuel loading table although there is obviously no point in transferring fuel into otherwise empty ' tanks or 11. If fuel on board is less than the minimum published quantity, the collector tanks should have sufficient for the planned manoeuvre and the remainder to be in 9 and/or 10 with at least 4000 kgs. in 9.
4. After doors are closed, arm the front L.H. and R.H. doors.
5. The aircraft may be taxied on two engines provided that each engi is capable of supplying a brake system i.e. green and yellow pressurised and that each engine has a serviceable electrical generation system.

AFTER START

1. After engine start, and on completion of the Afterstart Check, th Flight Engineer should set up the fuel and air conditioning syste then move into the co-pilot's seat to provide starboard look-out.

AFTER SHUT DOWN

1. Whenever an aircraft is taxied for positioning purposes, an entry must be made in the Maintenance Log as follows:-

   (a) Positioning to LHR Central Before Flight

   On the Aircraft Movement Signal, enter aircraft registration sector reference "00", appropriate sequential trip reference chocks away and chocks under.

   On the Sector Defect Log, enter an item, "A/C taxied on .... engines," (state the engine numbers that may subsequently require a debow start).

   (b) Positioning to a Departure Gate Other Than at LHR or Positioning After Flight

   As above, but allocate the next sequential sector reference number.

2. Disarm the front L.H. and R.H. doors and insert the arming lever pins.

GROUND PROXIMITY WARNING SYSTEM

Concorde is equipped with a standard five mode GPWS.

Modes 1 to 4 warn of:

1) Excessive rate descent below 2500 ft RA.
2) Excessive closure rate with the ground.
3) Loss of altitude whilst below 700ft RA after take-off or go-around.
4) Gear not locked down below 500 ft or nose not fully down below 200 ft RA on approach.

The warnings for modes 1 to 4 are, a red flashing PULL-UP (pre-mod TERRAIN) light on each pilots instrument panel and a repetitive audio, "whoop whoop pull-up". The warnings continue until the aircraft is flown out of the hazardous situation.

Whenever such a warning occurs:-

1) On departure
   Disconnect the auto-pilot, if applicable, and apply full dry power together with reheat and contingency as required. Level the wings where possible and check and adjust pitch attitude to achieve a minimum speed of V_2 + 40 kts before initiating a climb.

2) En-route or Arrival.
   Disconnect the auto-pilot, if applicable, and apply full dry power together with reheat and contingency as required. Level the wings where possible and check and adjust pitch altitude to a minimum of 15° and climb away at not less than V_{REF} + 50 kts.

In either case do not disregard short duration warnings - take immediate action:

When the warning ceases check,

aircraft position,

radio and pressure altimeters,

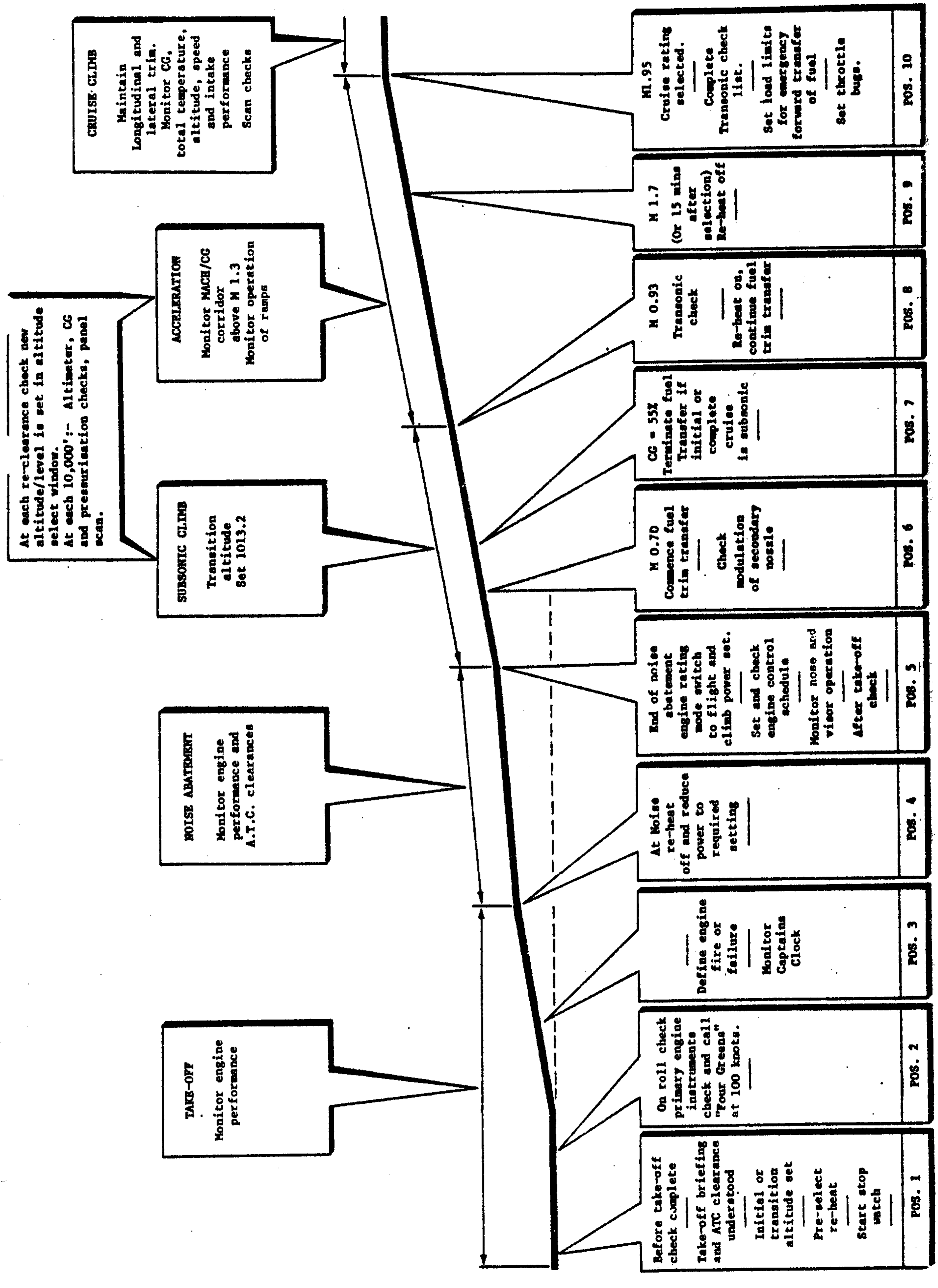
altimeter settings,

minimum safe altitude.

The mode 5 operation makes use of glideslope information and warns of 'duck-under' the glideslope during approach; the warning is audio only and repeats, "glideslope," until the aircraft is flown out of the hazardous situation.

Whenever such a warning occurs, disconnect the autopilot, if applicable. Apply power including reheat and contingency as required and adjust pitch attitude to regain the glideslope expeditiously. Continue approach or go-around as conditions allow.

FLIGHT ENGINEER'S ROUTINE PROCEDURES



TAKE-OFF
Monitor engine performance

NOISE ABATEMENT
Monitor engine performance and A.T.C. clearances

SUBSONIC CLIMB
Transition altitude
Set 1013.2

At each re-clearance check new altitude/level is set in altitude select window.
At each 10,000':- Altimeter, CG and pressurisation checks, panel scan.

ACCELERATION
Monitor MACH/CG corridor above M 1.3
Monitor operation of ramps

CRUISE CLIMB
Maintain Longitudinal and lateral trim.
Monitor CG, total temperature, altitude, speed and intake performance
Scan checks

POS. 1
Before take-off check complete
Take-off briefing and ATC clearance understood
Initial or transition altitude set
Pre-select re-heat
Start stop watch

POS. 2
On roll check primary engine instruments check and call "Four Greens" at 100 knots.

POS. 3
Define engine fire or failure
Monitor Captains Clock

POS. 4
At Noise re-heat off and reduce power to required setting

POS. 5
End of noise abatement engine rating mode switch to flight and climb power set.
Set and check engine control schedule
Monitor nose and visor operation
After take-off check

POS. 6
M 0.70
Commence fuel trim transfer
Check modulation of secondary nozzle

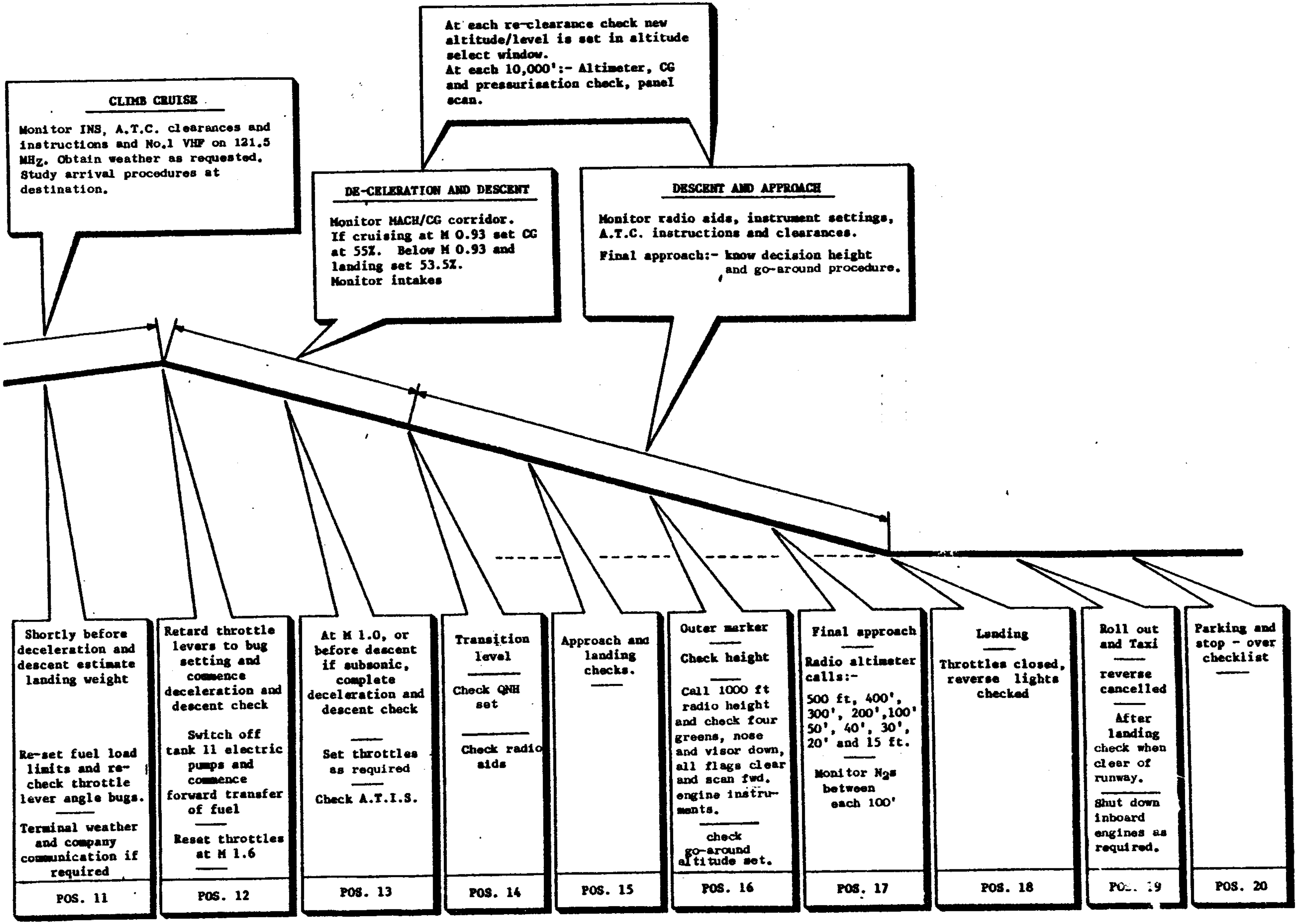
POS. 7
CG - 55%
Terminate fuel Transfer if initial or complete cruise is subsonic

POS. 8
M 0.93
Transonic check
Re-heat on, continue fuel trim transfer

POS. 9
M 1.7
(Or 15 mins after selection)
Re-heat off

POS. 10
M1.95
Cruise rating selected.
Complete Transonic check list.
Set load limits for emergency forward transfer of fuel
Set throttle bugs.

FLIGHT ENGINEER'S ROUTINE PROCEDURES



CLIMB CRUISE

Monitor INS, A.T.C. clearances and instructions and No.1 VHF on 121.5 MHz. Obtain weather as requested. Study arrival procedures at destination.

At each re-clearance check new altitude/level is set in altitude select window.
At each 10,000':- Altimeter, CG and pressurisation check, panel scan.

DE-CELERATION AND DESCENT

Monitor MACH/CG corridor. If cruising at M 0.93 set CG at 55%. Below M 0.93 and landing set 53.5%. Monitor intakes

DESCENT AND APPROACH

Monitor radio aids, instrument settings, A.T.C. instructions and clearances.

Final approach:- know decision height and go-around procedure.

POS. 11

Shortly before deceleration and descent estimate landing weight

Re-set fuel load limits and re-check throttle lever angle bugs.

Terminal weather and company communication if required

POS. 12

Retard throttle levers to bug setting and commence deceleration and descent check

Switch off tank 11 electric pumps and commence forward transfer of fuel

---

Reset throttles at M 1.6

POS. 13

At M 1.0, or before descent if subsonic, complete deceleration and descent check

---

Set throttles as required

Check A.T.I.S.

POS. 14

Transition level

Check QNH set

Check radio aids

POS. 15

Approach and landing checks.

POS. 16

Outer marker

Check height

Call 1000 ft radio height and check four greens, nose and visor down, all flags clear and scan fwd. engine instruments.

---

check go-around altitude set.

POS. 17

Final approach

Radio altimeter calls:-

500 ft, 400', 300', 200', 100' 50', 40', 30', 20' and 15 ft.

Monitor N_2s between each 100'

POS. 18

Landing

Throttles closed, reverse lights checked

POS. 19

Roll out and Taxi

---

reverse cancelled

After landing check when clear of runway.

Shut down inboard engines as required.

POS. 20

Parking and stop - over checklist

MONITORING AND CALLOUTS

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Pre Take-Off	Pre-Start	Pressure Altimeters	Both QNH Indicating Elevation				
		Trim	Check set for Take-Off				
		ASIs	Indices Set				
		Pitch Indices	Check set for Take-Off				
Take-Off	Roll	ASIs	Both Registering 'P' Only	"Airspeed Building"		X	
		ASIs -100 kts		"100 kts"		X	
		Power Check	4 lights		"Power Checked"	X	
					or "Engine Failure"		X
		ASI-V_1		"V_1"		X	
		ASI-V_R		"Rotate"		X	
		ASI-V_2		"V_2"		X	
	Initial Climb	Rad. Alt Climbing 20'		"Positive Climb"		X	
		240 knots		"240"		X	
		Noise Abatement		"3-2-1 NOISE"	(NOISE)	X	
		ASI Decaying to or below min		"Airspeed"			X
		VSI negative R.O.C.		"Rate of Climb"			X
		ADI Bank Angle ±2° from specified		"Bank Angle"			X

MONITORING AND CALLOUTS

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Climb	Every 10,000 feet	Altimeters	Subscale & Readings CG indication	"Altimeter Check" & CG	"Altimeter Check" & CG	X	
	When Altimeter setting changes	Altimeters	Subscale & Readings	"Transition Altitude"	"Transition Altitude"	X	
	Setting cleared Height	Altitude Select	Correct Height Set	"Cleared Altitude set"	"Cleared Altitude set"	X	
	Approaching Cleared Altitude	Altimeter		"1000 ft to Go"	"1000 ft to Go"	X	
Descent	Every 10,000 feet	Altimeters CG	Subscale & Readings CG. Indication	"Altimeter Check" & CG	"Altimeter Check" & CG	X	
	At 10,000 ft (or FL.100)	Altimeter	Subscale & Readings			X	
	Setting Cleared Height	Altitude Select	Correct Height Set	"Cleared Altitude Set"	"Cleared Altitude Set"	X	
	When Altimeter Setting changes	Altimeter	Subscale & Readings	"Transition Level"	"Transition Level"	X	
	Approaching Cleared Altitude	Altimeters		"1,000 ft to Go"	"1000 ft to Go"	X	

MONITORING AND CALLOUTS

(Unchanged)

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Approach	Approach Check	ASIs	Indices Set				
		Pressure Altimeter	Index set to QNH DH				
		Pressure Altimeters	QNH Set Alts Agree				
		Radio Altimeters	DH Pointer Set				
		Radio Altimeter	Radio Altimeter		"Radio Altimeter Active"	X	
	Final Approach	HSI Beam Bar Off Stop		"Beam Bar Active"	("Beam Bar Active")	X	
		HSI Glide Bar		"Glide Slope Active"	("Glide Slope Active")	X	
		HSIs	Beam and G/S Bars Agree Both Sides				
		GPWS audio "Glideslope"		"Glideslope"		X	
	At O.M.	Altimeters	Instruments	"Height Checks"		X	
	At 1000 ft RA	Radio Altimeter			"1000 ft radio"	X	
		ALTITUDE SELECT	Go-around altitude set	"Go-around altitude set"	("Go-around) (altitude set")	X	
		Nose /Visor & Landing Gear	Fully down Down & Locked	"5 greens" (1 nose & 4 gear)	("5 greens")	X	
		W&LD	Category Status	"Cat 1, 2 or 3" (autoland only)	("Cat 1, 2 or 3")	X	
						X	

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Approach	Final Approach Below 1000ft.	CAT 1 DH + 100 DH		"100 to Go" "Decision Height"	("100 to Go") ("Decision Height")		
		CAT 2 & CAT 3 300 Radio DH + 100 Radio DH		"Alert Height,cat.." "100 to Go" "Decision Height"	("Alert Height,cat..") ("100 to Go") ("Decision Height")		
		VASIS Indicate too high or low		"VASIS"			X
		VSI Excess 1000 F.P.M.		"Rate of descent"			X
		I.A.S. Near Min, Decaying Rapidly, or Approaching Max. Threshold Speed		"Airspeed"			X
		H.S.I. Beam Bar Exceeds 1 Dot Deflection		"Beam Bar"			X
		H.S.I. Glide Slope Exceeds 1 Dot Deflection		"Glide Slope"			X
		Radio Altimeter Reading			"800', 500', 400', 300', 200', 100', 50, 40, 30, 20, 15."	X	
	Flare	ADI, Pitch Attitude exceeds 12.5°		"Attitude"			X

MONITORING AND CALLOUTS

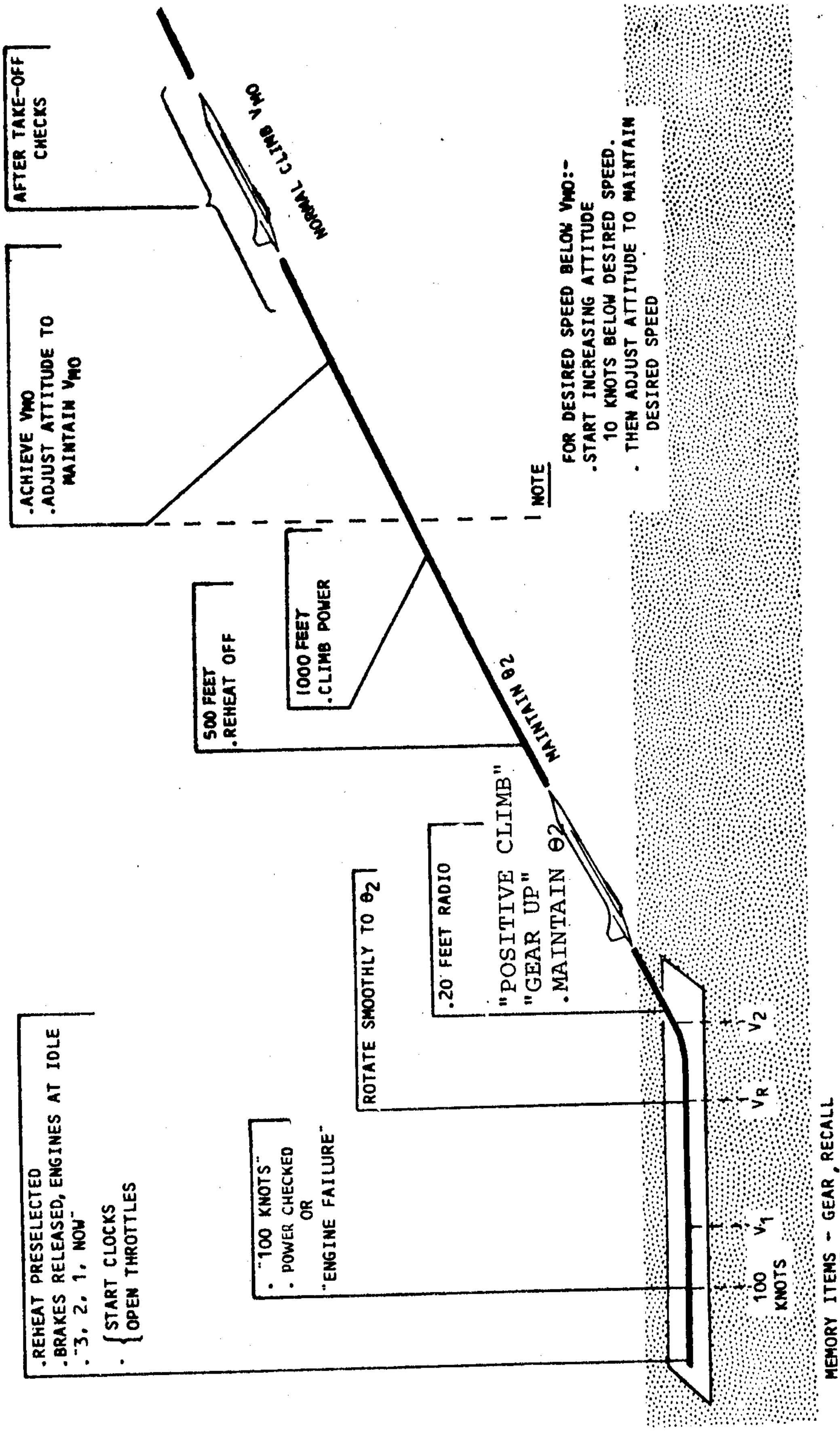
PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Approach: additional items applicable to Reduced Noise Approach only.		Radio Altimeter AFCS	IAS ACQ selected		**"800 ft"**	X	
		Radio Altimeter ASI, AT & HSI glide bar		"Stabilised"	**"500 ft" ("Stabilised")**	X	
		Radio Altimeter AFCS control panel		"Autopilot" (if AP or FD still engaged)	**"300 ft" ("Autopilot")**	X	

(Unchanged)

MONITORING AND CALLOUTS

PHASE	STAGE	ITEM/ INDICATION	CROSS-CHECK BY ALL CREW MEMBERS	CALLS		ROUTINE	WARNING
				PILOT NOT HANDLING	F.E.		
Missed Approach	Initial Climb	V.S.I - Climb		"Positive Climb"		X	
		A.S.I Decaying or below min.		"Airspeed"			X
		V.S.I. Negative R.O.C.		"Descending"			X
Landing	Deceleration	A.S.I. 100 knots		"100 knots"		X	
		75 knots		"75 knots"		X	
		HSI Ground Speed 40 knots		"40 knots"		X	
		20 knots		"20 knots"		X	
All Phases as appropriate		ADIs Excessive Roll or Pitch		"Bank Angle" "Pitch Attitude"			X X
		Altitude Alert Tone and/or light		"Altitude Alert"	"Altitude Alert"	X	X
		G.P.W.S. Pull-up lts (pre-mod, Terrain) plus audio "Pull-up".		"PULL-UP" Warning"			X

TAKE OFF AND INITIAL CLIMB
NORMAL TAKE-OFF



- .REHEAT PRESELECTED
- .BRAKES RELEASED, ENGINES AT IDLE
- ."3, 2, 1, NOW"
- . {START CLOCKS / OPEN THROTTLES

- . "100 KNOTS"
- . POWER CHECKED
- OR
- "ENGINE FAILURE"

ROTATE SMOOTHLY TO θ_2

- .20 FEET RADIO
- "POSITIVE CLIMB"
- "GEAR UP"
- .MAINTAIN θ_2

- 500 FEET
- .REHEAT OFF

- 1000 FEET
- .CLIMB POWER

- .ACHIEVE VMO
- .ADJUST ATTITUDE TO MAINTAIN VMO

NOTE

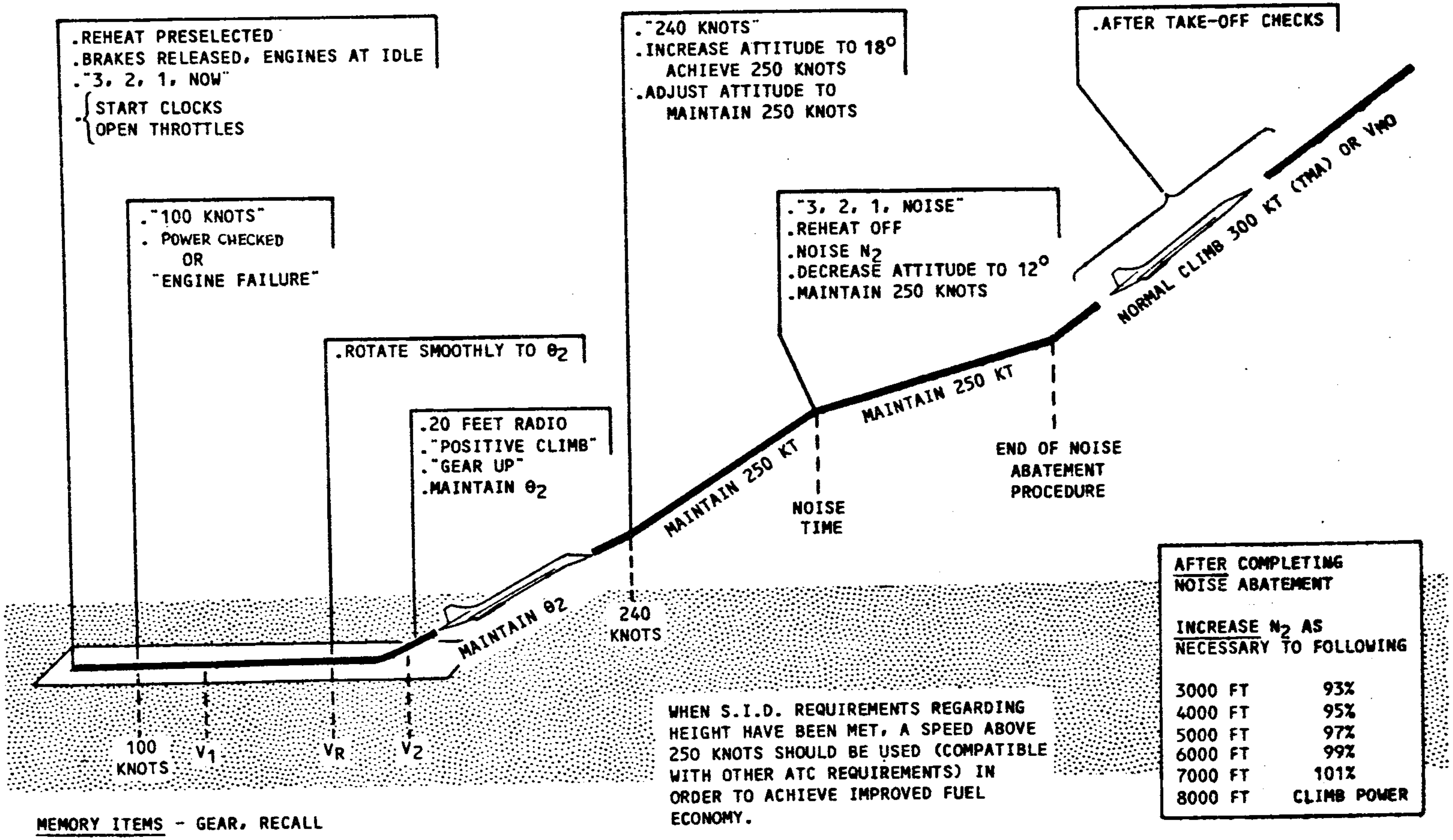
FOR DESIRED SPEED BELOW VMO:-
- .START INCREASING ATTITUDE 10 KNOTS BELOW DESIRED SPEED.
- . THEN ADJUST ATTITUDE TO MAINTAIN DESIRED SPEED

AFTER TAKE-OFF CHECKS

MEMORY ITEMS - GEAR, RECALL

NORMAL TAKE-OFF

TAKE-OFF AND INITIAL CLIMB
NOISE ABATEMENT TAKE-OFF



- .REHEAT PRESELECTED
- .BRAKES RELEASED, ENGINES AT IDLE
- ."3, 2, 1, NOW"
- .{START CLOCKS
OPEN THROTTLES

- ."100 KNOTS"
- . POWER CHECKED OR "ENGINE FAILURE"

- .ROTATE SMOOTHLY TO θ_2

- .20 FEET RADIO
- ."POSITIVE CLIMB"
- ."GEAR UP"
- .MAINTAIN θ_2

- ."240 KNOTS"
- .INCREASE ATTITUDE TO 18° ACHIEVE 250 KNOTS
- .ADJUST ATTITUDE TO MAINTAIN 250 KNOTS

- ."3, 2, 1, NOISE"
- .REHEAT OFF
- .NOISE N_2
- .DECREASE ATTITUDE TO 12°
- .MAINTAIN 250 KNOTS

- .AFTER TAKE-OFF CHECKS

AFTER COMPLETING NOISE ABATEMENT

INCREASE N_2 AS NECESSARY TO FOLLOWING

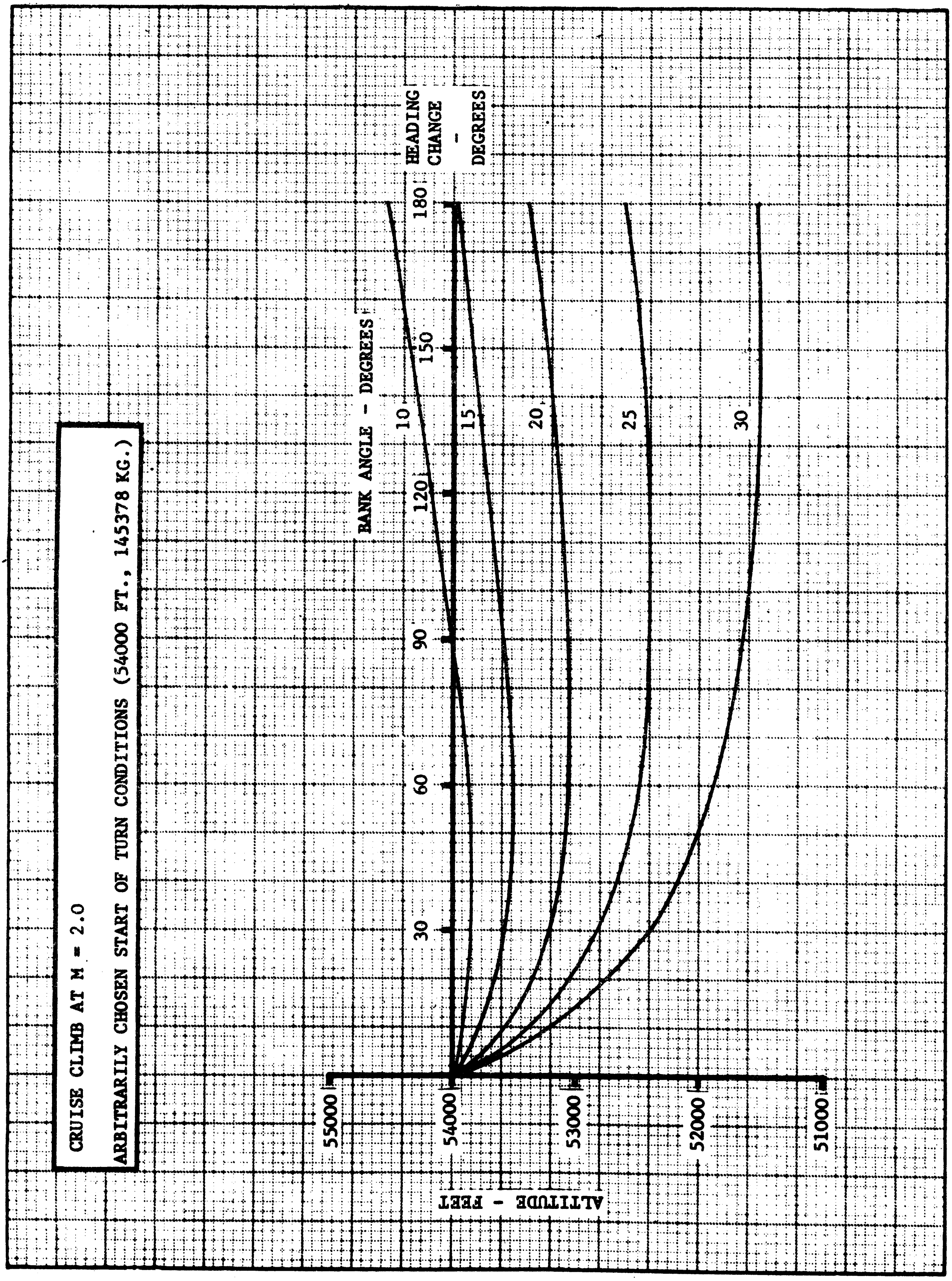
3000 FT	93%
4000 FT	95%
5000 FT	97%
6000 FT	99%
7000 FT	101%
8000 FT	CLIMB POWER

WHEN S.I.D. REQUIREMENTS REGARDING HEIGHT HAVE BEEN MET, A SPEED ABOVE 250 KNOTS SHOULD BE USED (COMPATIBLE WITH OTHER ATC REQUIREMENTS) IN ORDER TO ACHIEVE IMPROVED FUEL ECONOMY.

MEMORY ITEMS - GEAR, RECALL

NOISE ABATEMENT TAKE-OFF

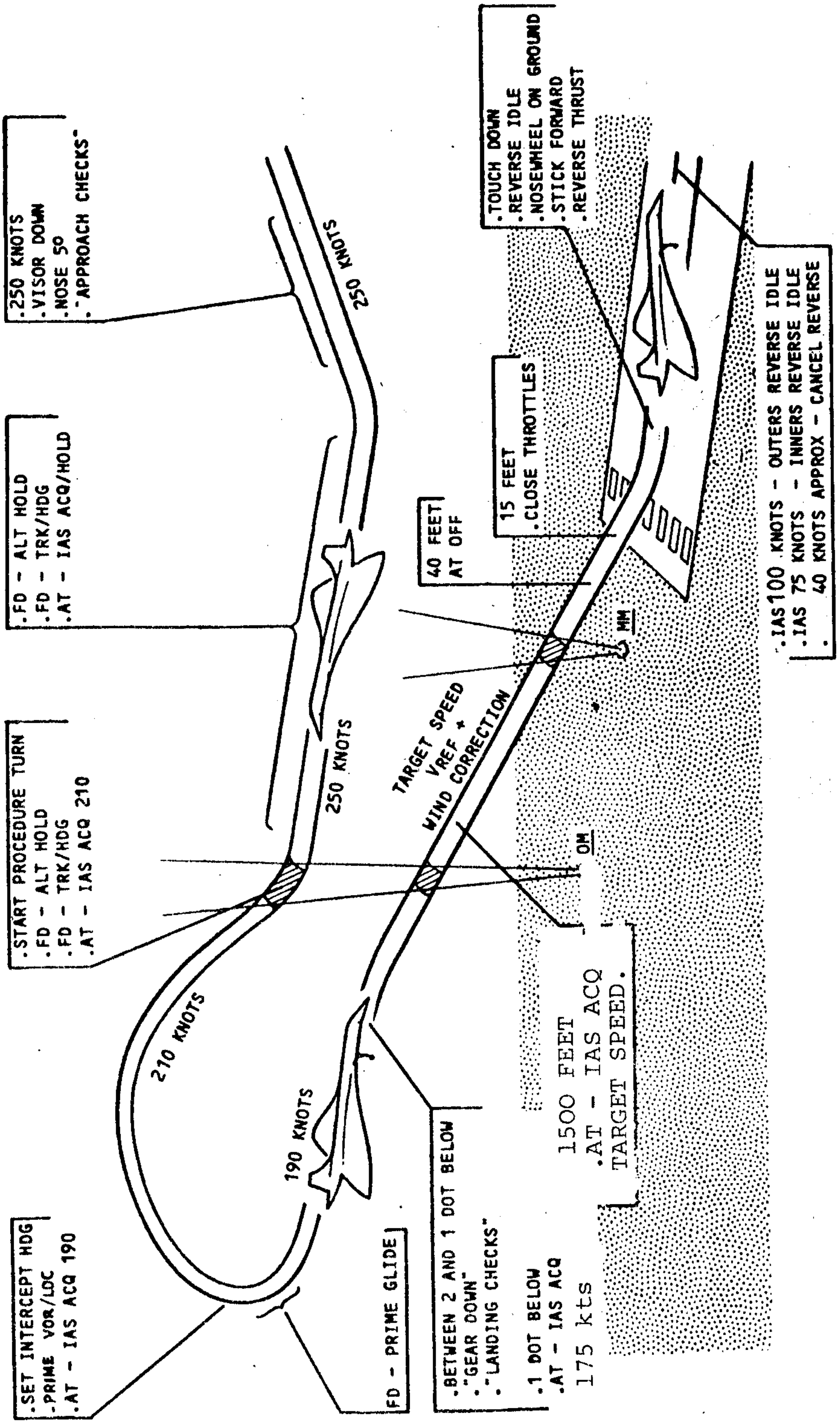
SUPERSONIC CRUISE
EFFECT OF BANK ON PERFORMANCE


CRUISE CLIMB AT M = 2.0

ARBITRARILY CHOSEN START OF TURN CONDITIONS (54000 FT., 145378 KG.)

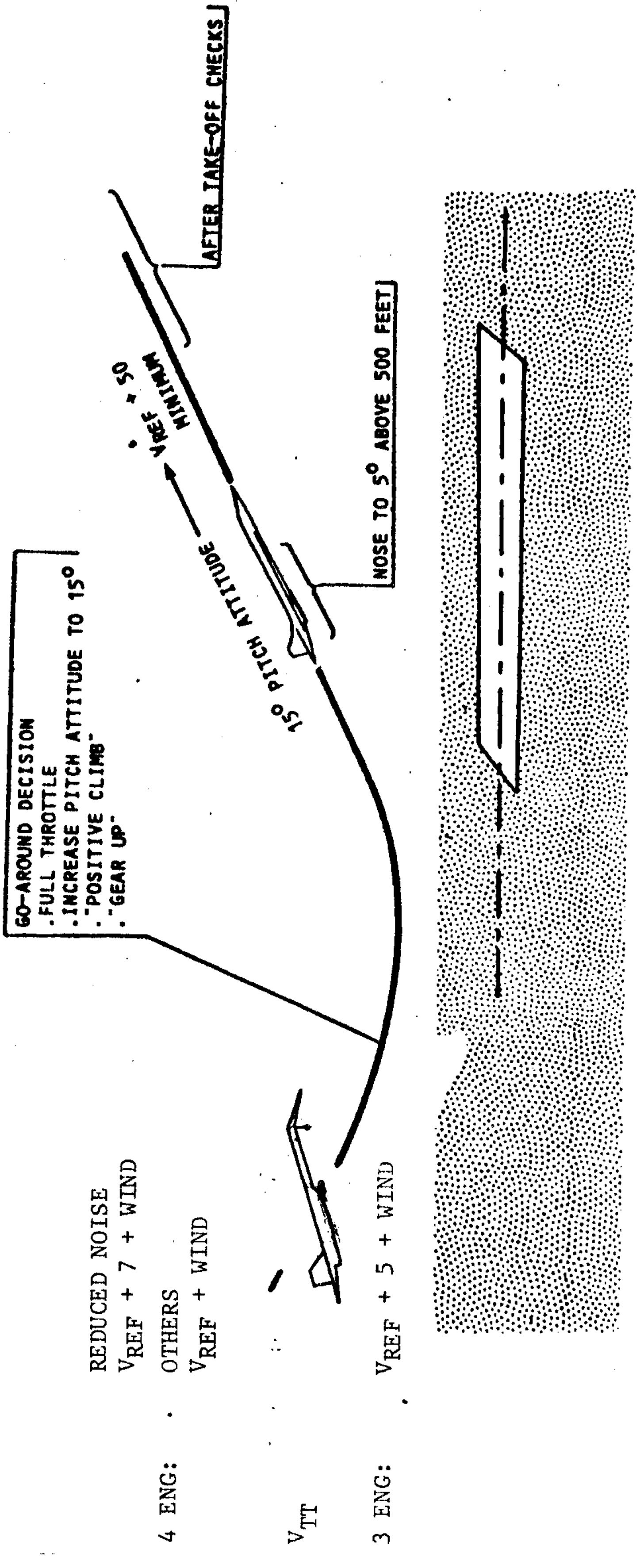
APPROACH AND LANDING

4 ENG. ALL WEATHER ILS



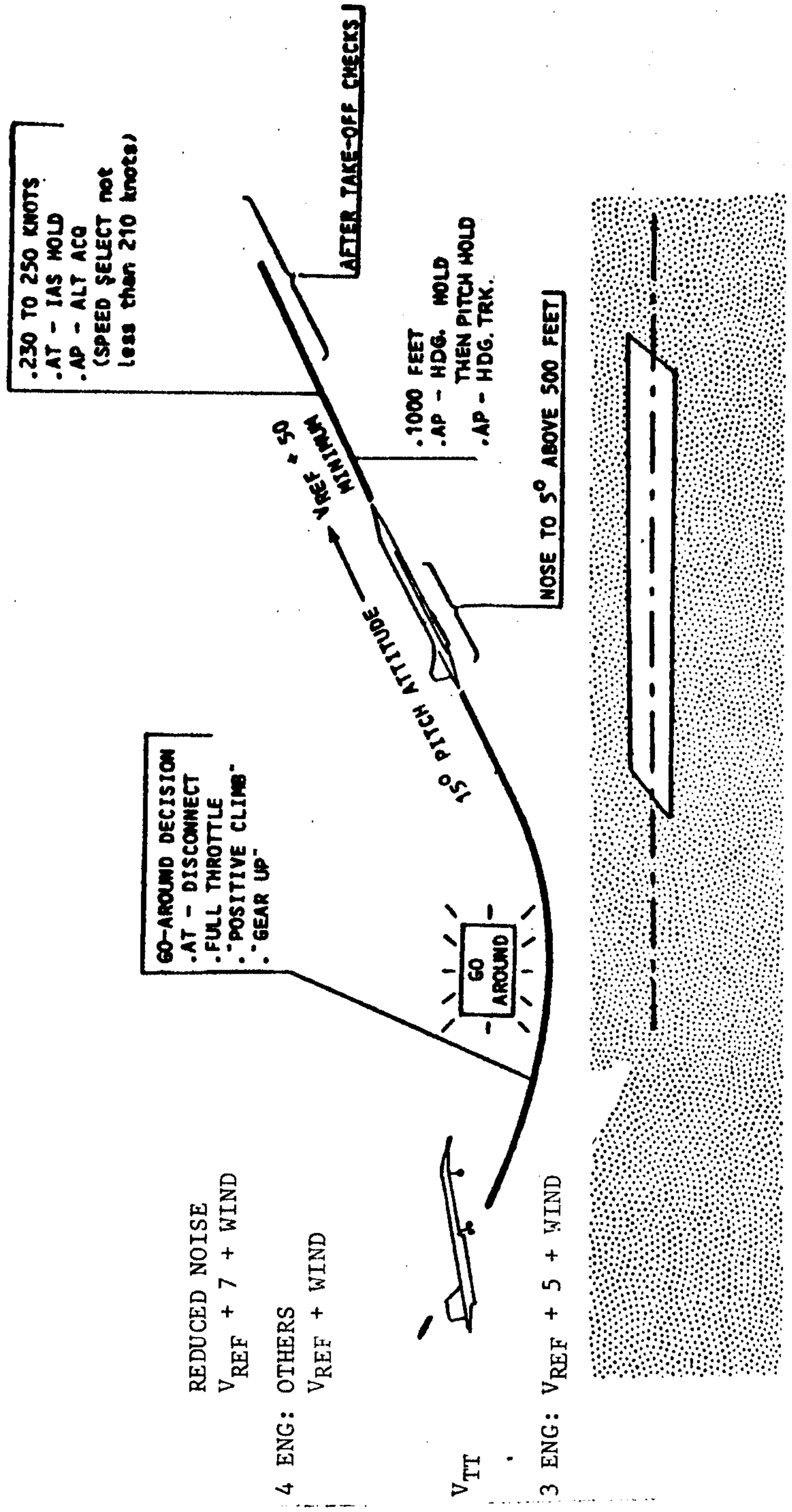
4 ENG ALL WEATHER ILS APPROACH AND LANDING

APPROACH AND LANDING
4 ENGINE AND 3 ENGINE GO-AROUND



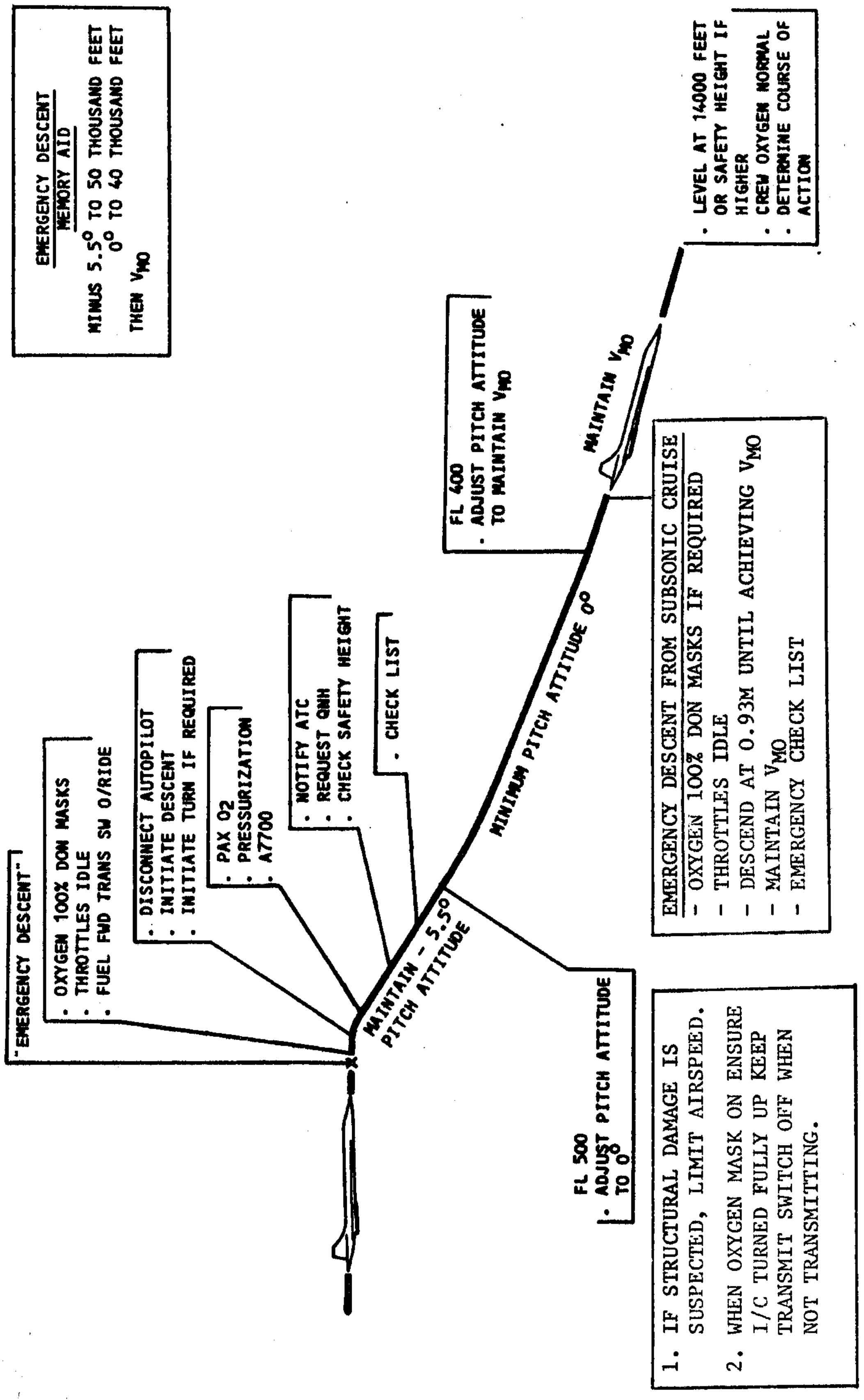
4 ENGINE AND 3 ENGINE GO-AROUND

APPROACH AND LANDING
AUTOPILOT GO-AROUND



AUTOPILOT GO-AROUND

EMERGENCY DESCENT


"EMERGENCY DESCENT"
. OXYGEN 100% DON MASKS
. THROTTLES IDLE
. FUEL FWD TRANS SW O/RIDE
. DISCONNECT AUTOPILOT
. INITIATE DESCENT
. INITIATE TURN IF REQUIRED
. PAX O2
. PRESSURIZATION
. A7700
. NOTIFY ATC
. REQUEST QNH
. CHECK SAFETY HEIGHT
. CHECK LIST
MAINTAIN - 5.5° PITCH ATTITUDE
FL 500
. ADJUST PITCH ATTITUDE TO 0°
MINIMUM PITCH ATTITUDE 0°
FL 400
. ADJUST PITCH ATTITUDE TO MAINTAIN V_{MO}
MAINTAIN V_{MO}
. LEVEL AT 14000 FEET OR SAFETY HEIGHT IF HIGHER
. CREW OXYGEN NORMAL
. DETERMINE COURSE OF ACTION

EMERGENCY DESCENT
MEMORY AID

MINUS 5.5° TO 50 THOUSAND FEET
0° TO 40 THOUSAND FEET
THEN V_{MO}

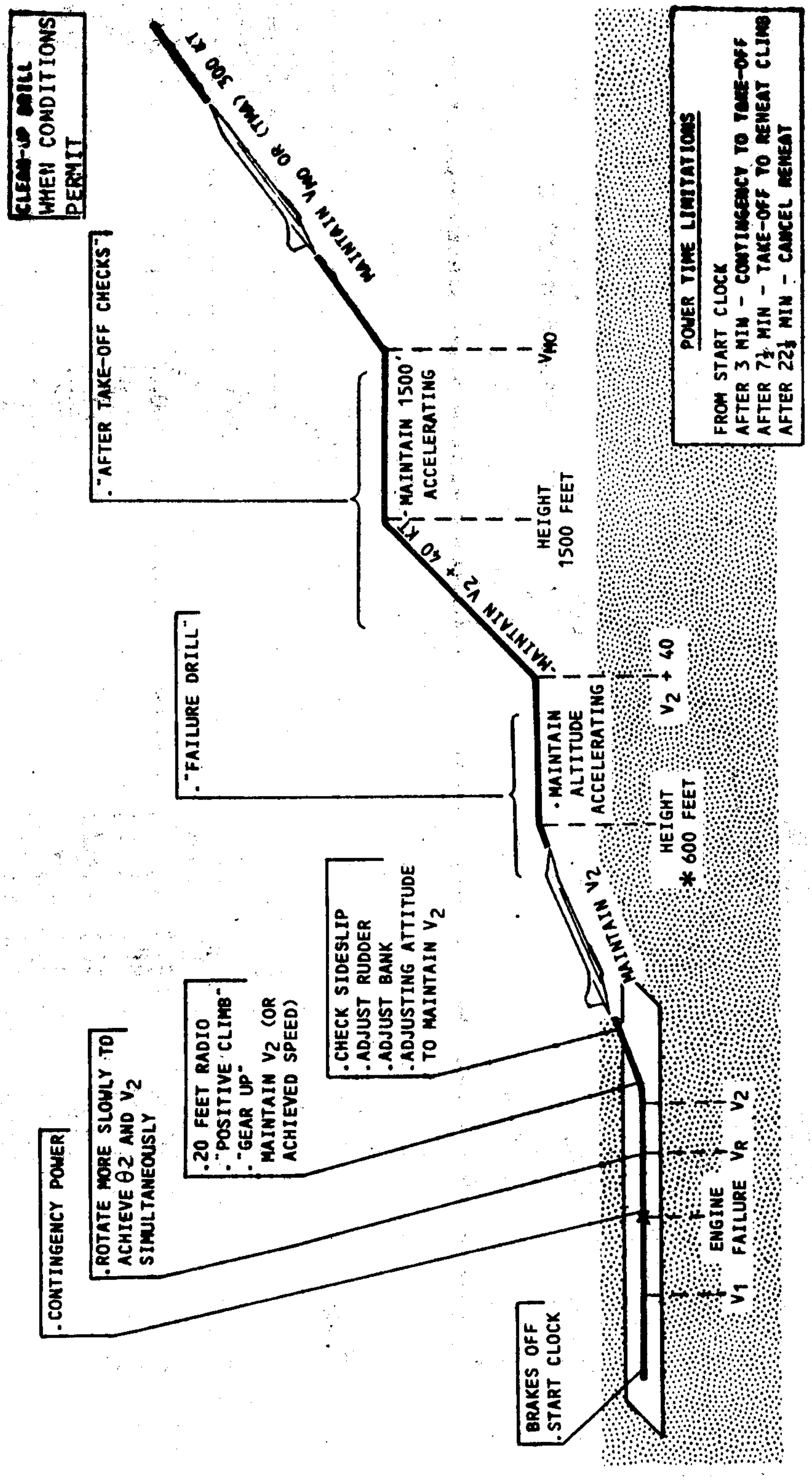
EMERGENCY DESCENT FROM SUBSONIC CRUISE
- OXYGEN 100% DON MASKS IF REQUIRED
- THROTTLES IDLE
- DESCEND AT 0.93M UNTIL ACHIEVING V_{MO}
- MAINTAIN V_{MO}
- EMERGENCY CHECK LIST

1. IF STRUCTURAL DAMAGE IS SUSPECTED, LIMIT AIRSPEED.
2. WHEN OXYGEN MASK ON ENSURE I/C TURNED FULLY UP KEEP TRANSMIT SWITCH OFF WHEN NOT TRANSMITTING.

EMERGENCY DESCENT

(Deletion)

ENGINE FAILURE AFTER V_1 ALTERNATIVE 1

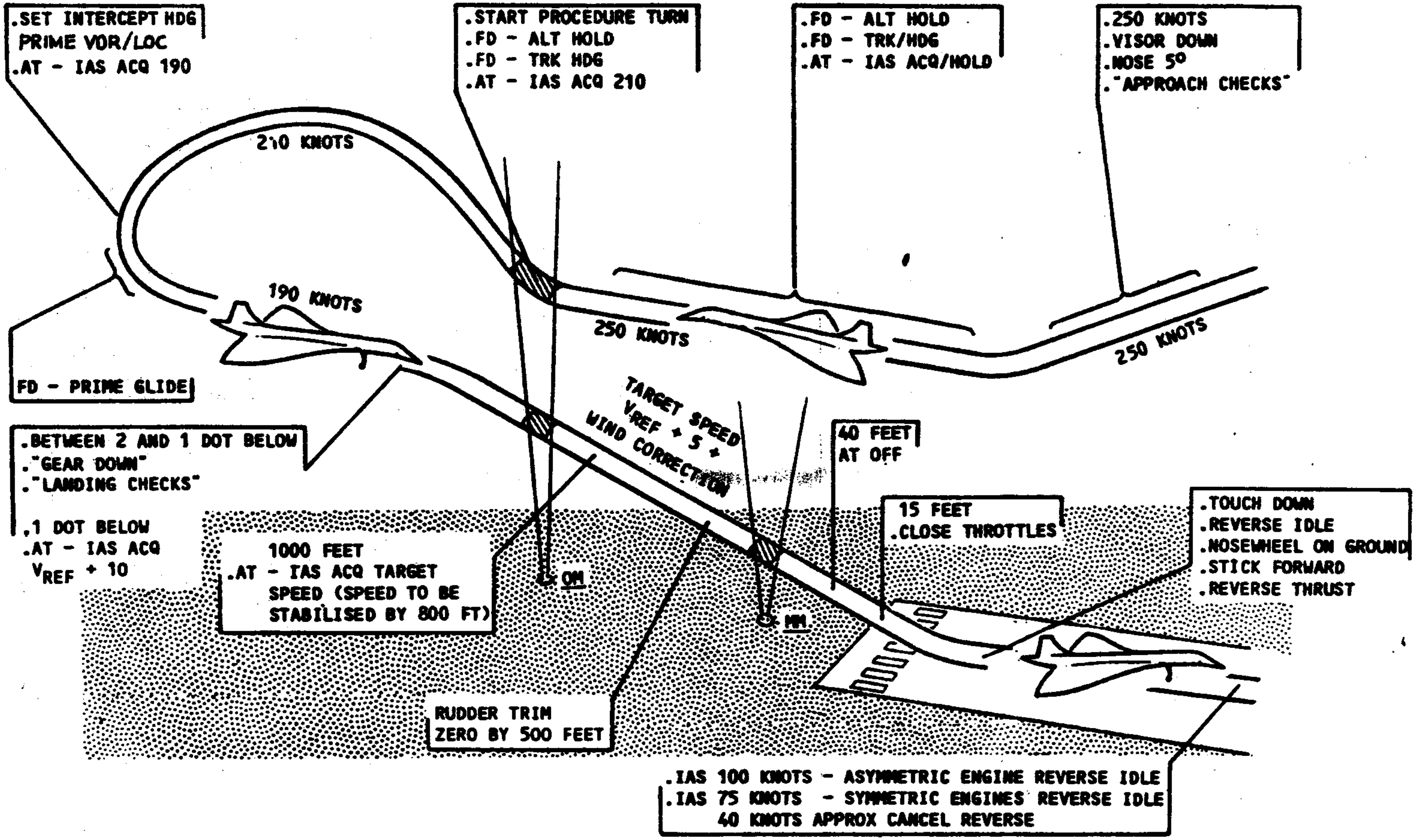

CLEAN-UP DRILL WHEN CONDITIONS PERMIT
MAINTAIN VMO OR (IMN) 300 KT
."AFTER TAKE-OFF CHECKS"
.MAINTAIN 1500' ACCELERATING
VMO
HEIGHT 1500 FEET
POWER TIME LIMITATIONS
FROM START CLOCK
AFTER 3 MIN - CONTINGENCY TO TAKE-OFF
AFTER 7½ MIN - TAKE-OFF TO REHEAT CLIMB
AFTER 22½ MIN - CANCEL REHEAT
.MAINTAIN V2 + 40 KT
."FAILURE DRILL"
.MAINTAIN ALTITUDE ACCELERATING
V2 + 40
HEIGHT
* 600 FEET
MAINTAIN V2
.CHECK SIDESLIP
.ADJUST RUDDER
.ADJUST BANK
.ADJUSTING ATTITUDE TO MAINTAIN V2
.20 FEET RADIO
."POSITIVE CLIMB"
."GEAR UP"
.MAINTAIN V2 (OR ACHIEVED SPEED)
.ROTATE MORE SLOWLY TO ACHIEVE θ2 AND V2 SIMULTANEOUSLY
.CONTINGENCY POWER
BRAKES OFF
.START CLOCK
V1
ENGINE FAILURE
VR
V2

ENGINE FAILURE AFTER V_1 ALTERNATIVE 1

(Deletion)

ENGINE FAILURES

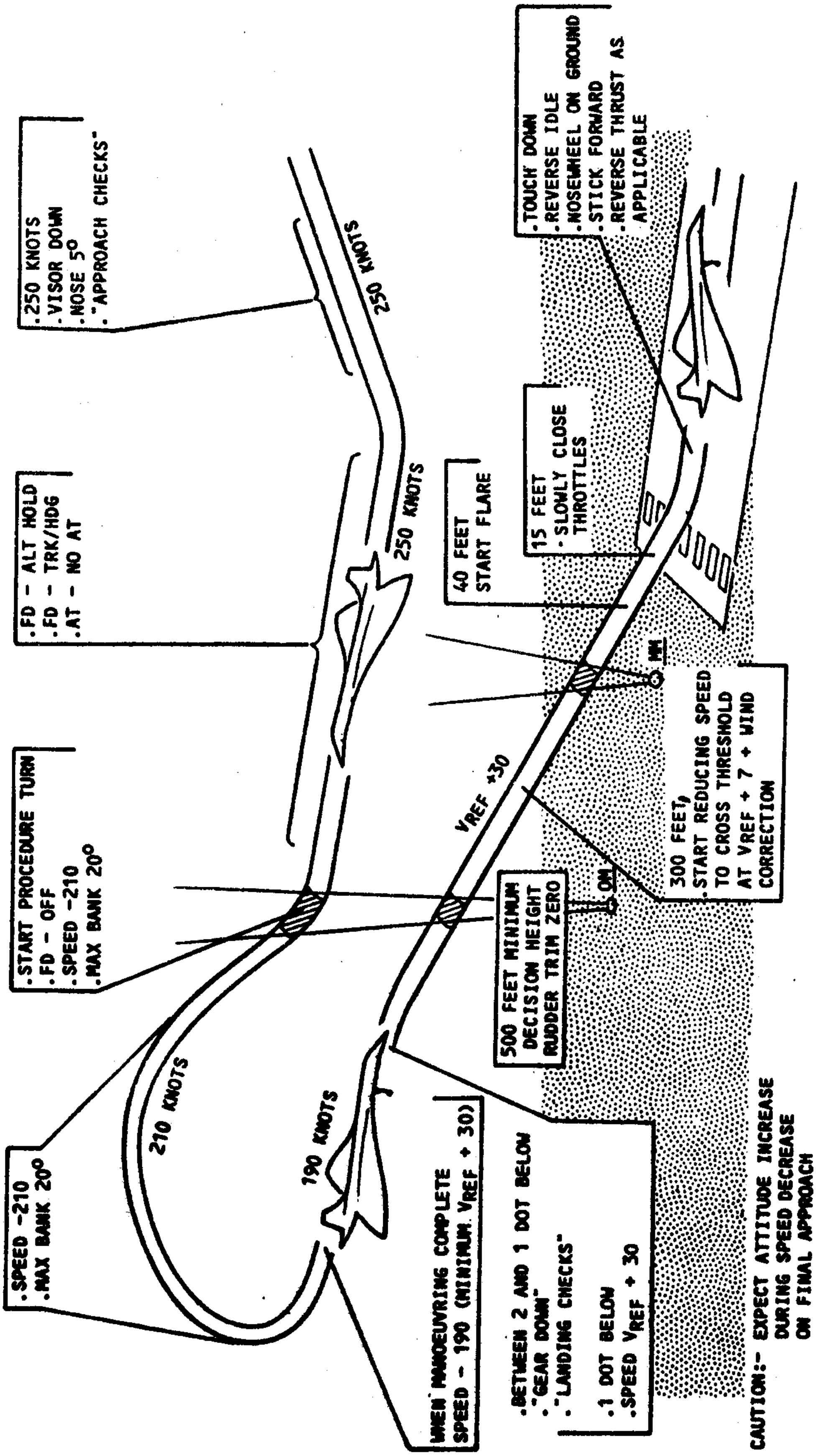
3 ENGINE ILS APPROACH AND LANDING



3 ENGINE ILS APPROACH AND LANDING
MANUAL WITH FLIGHT DIRECTOR

ENGINE FAILURES

2 ENGINE ILS APPROACH AND LANDING

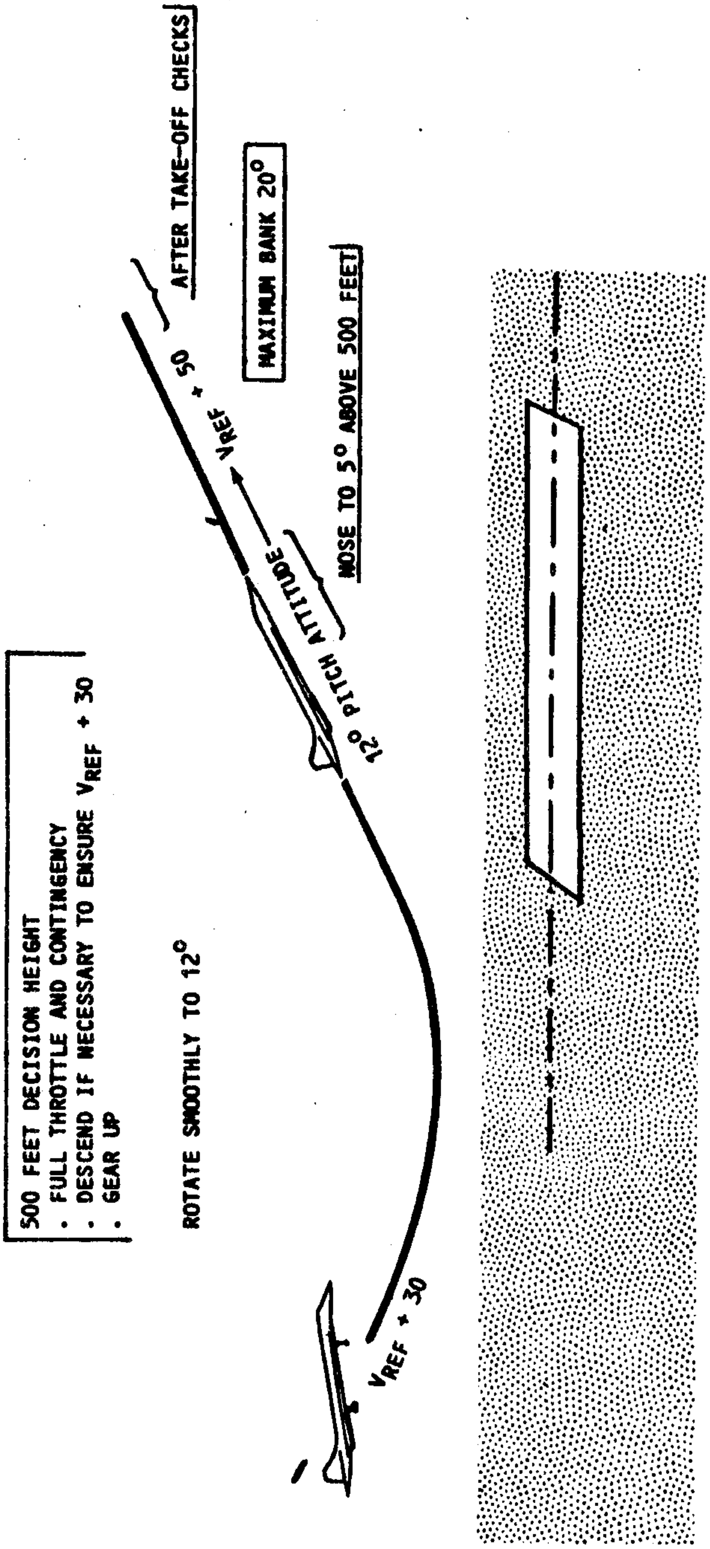


CAUTION:- EXPECT ATTITUDE INCREASE
DURING SPEED DECREASE
ON FINAL APPROACH
-EXPECT INCREASE RADIUS OF
TURN AT 210 KNOTS - 20° BANK

2 ENGINE ILS APPROACH AND LANDING

ENGINE FAILURES

2 ENGINE GO-AROUND

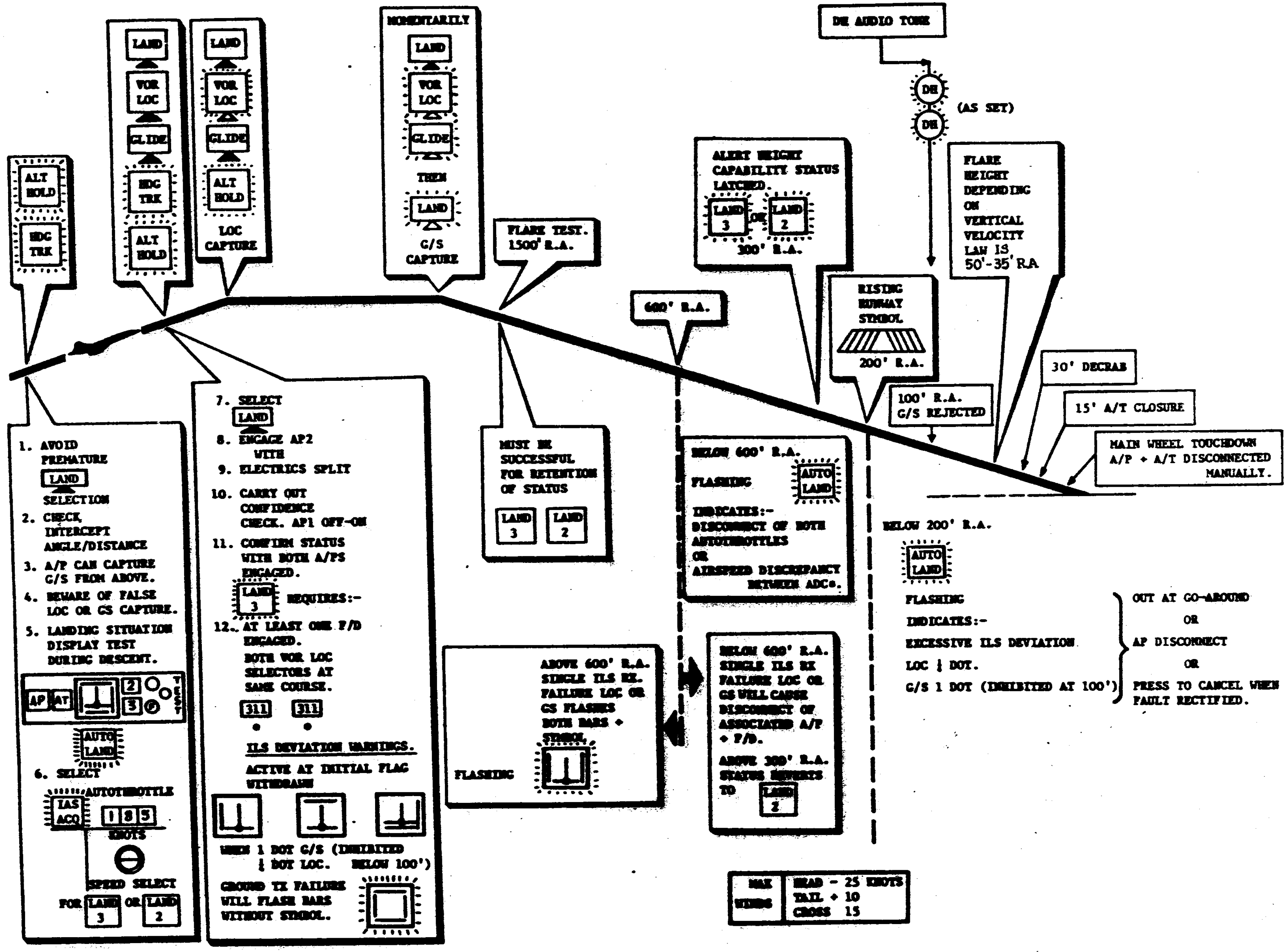


CAUTION - WITH BOTH LEFT ENGINES FAILED
GEAR CANNOT BE RAISED

2 ENGINE GO-AROUND

ALL WEATHER OPERATION

(Unchanged)



1. AVOID PREMATURE LAND SELECTION
2. CHECK, INTERCEPT ANGLE/DISTANCE
3. A/P CAN CAPTURE G/S FROM ABOVE.
4. BEWARE OF FALSE LOC OR GS CAPTURE.
5. LANDING SITUATION DISPLAY TEST DURING DESCENT.
6. SELECT AUTOTHROTTLE SPEED SELECT FOR LAND 3 OR LAND 2

7. SELECT LAND
8. ENGAGE AP2 WITH
9. ELECTRICS SPLIT
10. CARRY OUT CONFIDENCE CHECK. AP1 OFF-ON
11. CONFIRM STATUS WITH BOTH A/PS ENGAGED.
LAND 3 REQUIRES:-
12.. AT LEAST ONE F/D ENGAGED.
BOTH VOR LOC SELECTORS AT SAME COURSE.

ILS DEVIATION WARNINGS.

ACTIVE AT INITIAL FLAG WITHDRAWN

WHEN 1 DOT G/S (INHIBITED BELOW 100')
½ DOT LOC.

GROUND TX FAILURE WILL FLASH BARS WITHOUT SYMBOL.

ABOVE 600' R.A. SINGLE ILS RX. FAILURE LOC OR GS FLASHES BOTH BARS + SYMBOL.

BELOW 600' R.A. AUTO LAND FLASHING INDICATES:- DISCONNECT OF BOTH AUTOTHROTTLES OR AIRSPEED DISCREPANCY BETWEEN ADCs.

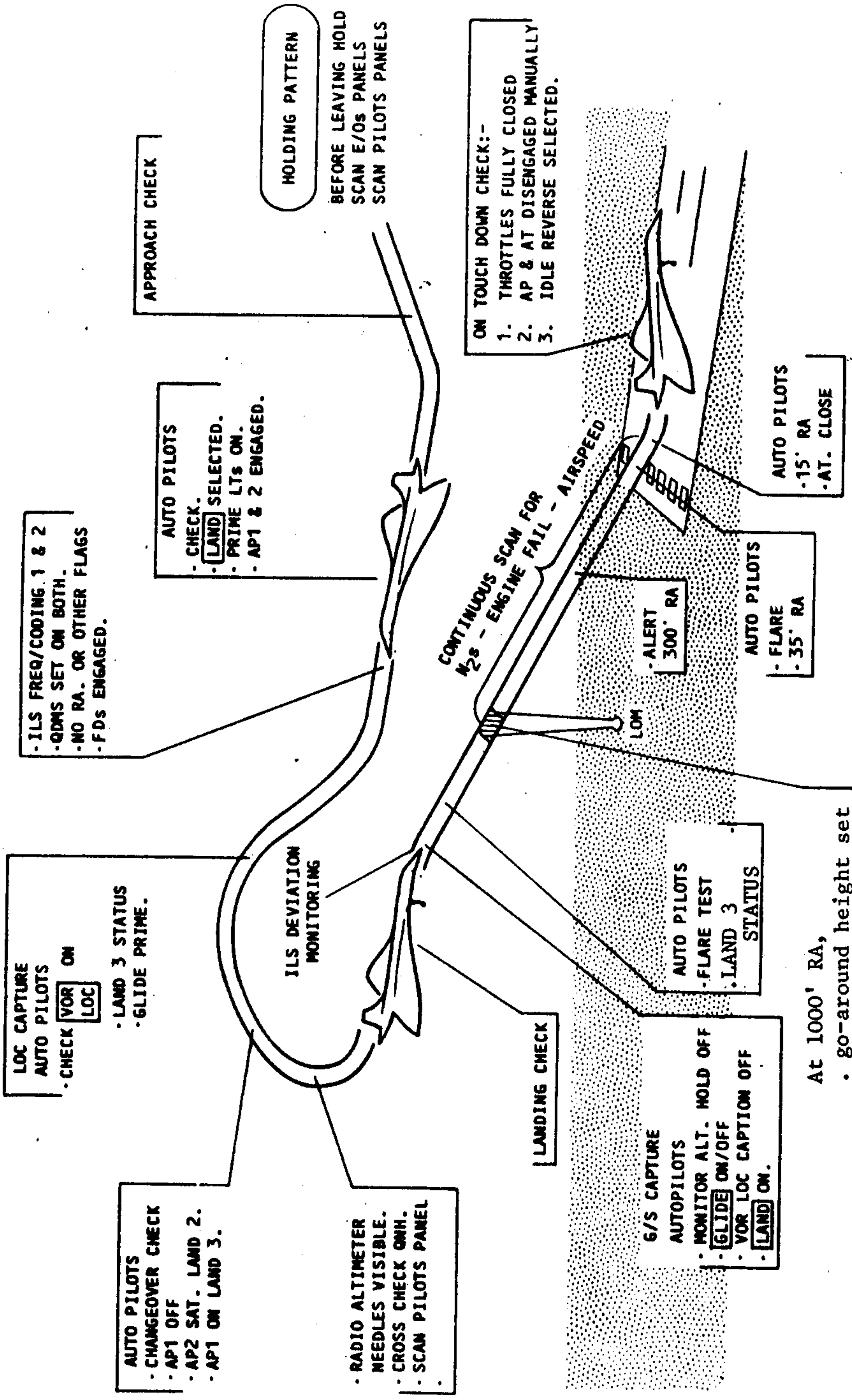
BELOW 600' R.A. SINGLE ILS RX FAILURE LOC OR GS WILL CAUSE DISCONNECT OF ASSOCIATED A/P + F/D.
ABOVE 300' R.A. STATUS REVERTS TO LAND 2

BELOW 200' R.A. AUTO LAND FLASHING INDICATES:-
EXCESSIVE ILS DEVIATION
LOC ½ DOT.
G/S 1 DOT (INHIBITED AT 100')

OUT AT GO-AROUND
OR
AP DISCONNECT
OR
PRESS TO CANCEL WHEN FAULT RECTIFIED.

MAX WINDS	
	HEAD - 25 KNOTS
	TAIL + 10
	CROSS 15

(Deletion)

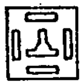


At 1000' RA,
- go-around height set
- 5 greens
- Category status

AUTOLAND CAT 3 - APPROACH PROFILE

AUTO PILOT
GLIDE & LAND MODES
ABNORMAL PROCEDURES

WARNING	CAUSE	ACTION	
		WITHOUT VISUAL REFERENCE	WITH VISUAL REFERENCE
A P red + audio	Both APs disengaged	CAT 1. Go-around or continue under manual control CAT 2.) Go-around CAT 3.)	Continue under manual control Note: If above 1,000ft. an attempt may be made to re-engage one or both autopilots.
A T red flashing	Both ATs disengaged	CAT 1. Auto-go-around or disengage AP & FD and continue under manual control CAT 2.) Auto go-around CAT 3.)	Disengage AP & FD and continue under manual control
AUTO LAND red flashing	Unsatisfactory ILS performance, ILS failure or ADS failure	Auto go-around	Disengage AP & AT and continue under manual control. Note: If accompanied by ADS warning, revert to standby ASI immediately
Capability indicators blank at 300ft. (No LAND 2 or LAND 3 indication)	Necessary crew actions incomplete or failure of essential system	Disengage AP at not less than 100ft. and make a manual landing	

WARNING	CAUSE	ACTION	
		WITHOUT VISUAL REFERENCE	WITH VISUAL REFERENCE
 One bar + symbol - steady	Excessive deviation from ILS centre line	Check ILS deviation. If error persists: CAT 1. Auto go-around or continue under manual control CAT 2.) Auto go-around CAT 3.)	Check flight path. If unsatisfactory disengage A and continue under manu control.
Two opposite bars + symbol - flashing	Failure of ILS receiver associated with controlling AP	CAT 1. Auto go-around or continue under manual control using serviceable receiver CAT 2.) Auto go-around CAT 3.) Note: If above, 1,000ft. the second AP may be engaged.	Disengage controlling AP & continue under manual control
Two opposite bars - flashing Symbol not illuminated	Failure of ILS transmitter	Auto go-around	Disengage controlling AP & continue under manual control.

Notes : (1) Below 600ft. in LAND mode failure of an ILS receiver causes disengagement of the associated AP and the bars and symbol do not flash.

(2) Below 200ft. excessive ILS deviation and ILS transmitter failure case the AUTCLAND warning to flash. Actions appropriate to that warning must be taken.